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PROSTATECTOMY*

BY

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The operation of prostatectomy in the strict sense of the term means removal of the prostate gland. It is a surgical procedure which has been recognized as justifiable only in comparatively recent times. Forty-five years ago Belfield of Chicago described extirpation of the entire prostate as a rare experiment, and it was not until 1901 that Freyer, by his writings, began to popularize the operation and show surgeons all over the world that it was a definite step forward in the treatment of simple enlargement of the gland. For the next twenty years the technique advocated by Freyer was accepted by all but a few. In 1916 Thomson-Walker and Judd independently introduced the method of open operation, as opposed to the closed and blind operation of Freyer, but again a number of years elapsed before it was realized that this was another milestone in the progress of prostatic surgery. Finally we turn to Australia to find that Harry Harris has been patiently developing a technique which, in my opinion, will add yet another to the successes achieved by surgeons owing allegiance to the British Commonwealth of Nations.

All these investigators attacked the gland by the suprapubic route. The perineal route has also had its advocates. It would appear by a study of the literature that Zuckerkandl of Vienna was the first to remove the whole of the enlarged prostate by a carefully considered perineal operation. This was in 1889. Since then the chief supporters of this method of approach have been Nicoll of Glasgow (1894), Fuller of New York (1895), Albarran of Paris (1901), and in recent years Young of Baltimore and Wildbolz of Berne.

It is not my intention to pursue the question as to which of these two operations gives the better results: suffice it that Wildbolz's technique, like Harris's, aims at reconstruction of the prostatic urethra. Of partial prostatectomy little need be said if the discussion is intended to bring out the views of urologists on the best methods of a radical cure for innocent lesions. The open operation for removal of only the intravesical part of the gland has had, since the days of Bottini (1885), an opponent in transurethral resection with the electric current. The latter aims at producing a gutter in the so-called middle lobe and shaving off parts of the lateral lobes. The latest statistics of this operation show a mortality rate ranging between 1 and 11 per cent. The enthusiasm for this method of treatment rises with the introduction of a new instrument (their number is legion) and falls as experience is gained in the final results. Until the pathology of diseases of the prostate has been clarified it will not be possible to assess the true value of any kind of electrical treatment.

The term "enlarged prostate" conveys nothing to the scientific mind except that the organ is increased in size. Permanency of freedom from symptoms, and therefore a radical cure, is dependent upon the successful removal of all diseased tissue and the anatomical deformities which it produces. These are the formation of diverticula and alterations in the length and curve of the prostatic urethra and the position of the internal meatus. The latter, in extreme cases, may be pushed as far forward as the pubis. On account of this change from the normal the patient is unable to empty his bladder completely. The amount of residual urine is regulated by the distance of the internal meatus from the base of the bladder, the degree of development of the intravesical growth, and the condition of the bladder musculature.

Prostatectomy for Non-malignant Conditions

It is opportune now to consider what actually happens in prostatectomy for non-malignant conditions and the nature of the tumour or tumours removed.

The fundamental difference between the operation for so-called simple enlargement and that for malignant growths, calculous disease, fibrosis, and prostatitis is that the enucleation in the hands of an expert is easily accomplished, whereas in the other four diseases mentioned, with one exception, dissection is necessary to assist in the removal. The exception is when clinically and to the naked eye the enlargement appears simple but the report of the pathologist is that there are one or more areas of a malignant nature within the substance of the tumour.

Considerable difference of opinion was revealed by investigators following Freyer's publications as to whether the prostate gland itself was enucleated. On the one hand, Thomson-Walker maintained that the wall of the prostatic bed was formed by thickened rectovesical fascia and that any prostatic tissue found in it was accidental; whereas, on the other hand, Cuthbert Wallace claimed that the diseased tissue removed was adenomatous and did not contain any gland tubes. According to the latter view prostatectomy is a misnomer for the operation of enucleation. My own observations support Cuthbert Wallace's findings.

The prostate gland simulates in many respects the female breast. The function of the latter is to feed the infant, that of the former to nourish the spermatozoon during its efforts to become wedded to the ovum. Both organs, when attacked by the same disease, show microscopical changes so closely resembling one another that in the case of one type of enlargement of the prostate it is often difficult to differentiate it from a fibro-adenoma of the breast.

Wallace showed that the mass of pathological tissue enucleated by the finger consisted of one or more adenomata, and that these were surrounded by a capsule of fibrous tissue which enclosed the atrophied gland tubes. The bigger the tumour the smaller is the amount of pros-

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tate gland remaining. This is a very good example of pressure atrophy. Further evidence in support of Wallace's contentions is that castration causes no alteration in the size of the enlarged prostate.

The normal gland was demonstrated by E. R. Kirby as far back as 1893 to atrophy when both testicles were removed, and this line of treatment was taken up enthusiastically by surgeons during the following years. The results of this mutilating operation were, of course, disappointing. No one had got a clear idea of the pathological changes at work, and even at the present time there are still many who believe that when they are enucleating the adenomatous tissue from the prostate the gland itself is also being removed.

There are two descriptions given to adenomatous disease of this organ which should be entirely banished from the nomenclature. They are "chronic hypertrophy" and "senile enlargement." First, this is not a disease primarily associated with old age. From 40 years upwards the changes in the gland may be taking place, and the symptoms observed in elderly men represent an advanced stage of the malady. Secondly, whatever views may be held with regard to the pathology of simple enlargement, it is contrary to the laws of nature for a sexual gland to undergo hypertrophy after man has reached maturity.

A Radical Cure Essential

It is necessary to stress the importance of the eradication of the whole of the diseased portion of the gland if the patient is to be cured, and therefore permanently relieved of all his symptoms. From time to time a case of recurrence of prostatic enlargement is recorded and the specimen is exhibited at a meeting of practitioners. Such a mishap demonstrates failure on the part of the surgeon who performed the original operation. He had left behind a portion of the adenomatous tissue at the time of enucleation.

Some years ago I operated on a clergyman, 75 years of age, for haematuria due to adenomatous disease of the prostate. The history was that twice previously prostatectomy had been performed, first when 60 years of age, and, secondly, eight years later. I removed by enucleation a mass of adenomatous tissue about the size of a tangerine orange. The patient made an uneventful recovery from his third suprapubic prostatectomy.

What are the factors which determine the amount of prostatic urethra left behind after enucleation of adenomata? One factor, of course, must be the technique employed for the actual removal of the diseased tissues, and whatever the method of enucleation the surgeon chooses to adopt it must be one that ensures a radical cure.

Can this be accomplished if the technique is such that it preserves intact the mucosal covering of the prostatic urethra? The answer is in the negative. The enucleated tissue must include all that which lies immediately behind the prostatic urethra. It is impossible to do this without fracturing the latter at some point between the internal meatus and the triangular ligament. Moreover, it is unlikely that much of the urethral mucous membrane which traverses the mass of tissue to be removed can be left behind.

It is my experience that in the large majority of cases the methods of enucleation as practised by urologists to-day do not allow the preservation of the whole of the prostatic urethra. No technique has yet been introduced which permits of this happy consummation.

The second factor in the determination of the amount of prostatic urethra which can be retained is the mode of development of the growth. All urologists are aware that growth takes place in two directions—namely, backwards towards the rectum and upwards into the bladder, well named the intravesical projection.

Extension of the disease downwards is limited by the triangular ligament and forwards by the pubis. In some cases there is no projection into the bladder, but a large mass is felt per rectum. Conversely, rectal palpation fails to demonstrate any enlargement, but cystoscopy reveals an intravesical development. In the latter type enucleation is so simple that one sweep of the finger around the tumour causes it to fall into the bladder with the urethra unfractured. It is with this class of case that most of the prostatic urethra can be preserved. In fact the growth has surrounded only a very small portion of the tube at its vesical end, leaving the main portion in contact with healthy glandular tissue.

Where the disease has spread in the direction of the rectum and triangular ligament, and the internal meatus shows but slight alteration from the normal, the whole of the urethra from the vesical orifice to its commencement as the membranous portion has to be taken away. In such cases there is no healthy prostatic tissue in contact with the urethra. Moreover, the verumontanum is either so stretched out transversely as to be hardly recognizable or else it is elongated into a narrow low ridge.

The Bladder and Urethra after Operation

Let us now consider what occurs in the bladder and urethra during the period of post-operative convalescence. The changes must be studied according to the type of operation which has been performed. The three suprapubic techniques which stand out as landmarks in prostatectomy are those advocated by Freyer, Thomson-Walker, and Harris.

By the Freyer and Thomson-Walker methods the prostatic cavity after enucleation is left bare of mucous membrane, and no attempt is made to unite the bladder to the torn end of the urethra. Eventually this occurs by what one may term secondary intention. Harris, on the other hand, claims that he obtains union by first intention. In the Freyer technique, apart from irrigation with hot antiseptic fluids, no effort is made to control haemorrhage. Thomson-Walker, with bladder retractors, was able to observe the bleeding points and, by means of a circular suture round the torn rim of internal meatus, ligated many vessels, but haemostasis was rarely complete. So to ensure immunity from further haemorrhage, a catheter was passed, and around it, within the prostatic cavity, was packed iodoform gauze. Substitutes for the latter have been various rubber bags, the best known of which is de Ribes'.

The difference between healing by secondary and primary intention is in the amount of fibrous tissue which forms. In primary union a thin scar is observed, which as it grows old may be difficult to find. A scar formed by secondary intention is a disfigurement, and often leads to interference with function. The former result is of no practical importance so far as the bladder is concerned, but if following prostatectomy micturition is not restored to the normal the operation has failed to achieve its main purpose. Foreign substances other than metallic retained in the tissues promote sepsis and subsequently fibrosis. Therefore rubber bags and gauze inserted into the prostatic cavity are going to stimulate the growth of fibroblastic cells by the irritation they set up. Persistent bleeding exhausts the patient, and is the ally of bacteria.

It is clear, then, that it is a speculation with any technique which fails to control haemorrhage whether the operation will attain its main objective. In Freyer's day bladder sepsis was rampant long before the patient submitted himself to the removal of his prostate, and the striking fact of this era in the history of prostatectomy was that the man on catheter life discovered, to his immense joy, that he could once more pass water without the aid of instruments. Micturition, however, was far

from normal, and many were the sequelae of this crude technique.

Thomson-Walker, by his open operation, set to work to abolish these disabilities, and a large measure of success rewarded his efforts, but healing was still by secondary intention. Therefore the amount of fibrous tissue which formed during convalescence was problematical. Moreover, in my opinion the post-prostatic pouch was not always obliterated, which meant that the patient could not completely empty his bladder.

Another extremely disturbing defect—fortunately rare, but one common to all techniques except the Harris—has been the failure of the trigonal flap of mucous membrane to adhere to the tissues beneath. This has left a cavity between the healed urethra at its junction with the bladder base and the anterior wall of the rectum. After the lapse of some months there is a tendency for the new internal meatus to contract. Instrumentation is needed to relieve the difficulty in micturition, and the point of the catheter or bougie may be pushed through the urethra into this cavity. Suppuration follows, with still further stripping-up of the trigone from the tissues beneath. Ultimately the patient is compelled to submit to suprapubic cystotomy for reconstruction of the bladder base and urethra.

In both the Freyer and the Thomson-Walker techniques a large rubber tube is inserted into the bladder through the abdominal wall, to allow of the escape of blood and urine. Suprapubic drainage is persisted in until about the tenth day. Healing of this fistula is by secondary intention, and infection of the tissues forming its walls is the rule rather than the exception. Sometimes severe secondary haemorrhage occurs from the vessels bordering on this track.

There is probably general agreement among urologists that the open operation has reduced the number of sequelae for which sepsis is responsible. Stone in the bladder following prostatectomy in the years before the great war was a fairly frequent occurrence, and urethral obstruction due to excessive scarring at the site of operation was met with in a small percentage of cases. Vesiculitis and orchitis were most unwelcome indications of profound sepsis originating in the prostatic bed.

With the introduction of the Thomson-Walker technique stone formation has become a rare complication, but post-operative urethral obstruction still occurs for the reasons to which I have already referred. Also vesiculitis and orchitis are far too common to satisfy the serious student of prostatic surgery.

Therefore in assessing the progress made from 1916 to 1927 (the year Harris described his technique) it is clear that, though many problems remained unsolved, septic complications were reduced, haemorrhage was less severe, and the functional results showed a decided improvement.

The Harris Technique

The changes in the bladder and urethra during the post-operative convalescence when the Harris technique has been practised vary considerably from those which have been described by the Freyer and the Thomson-Walker methods. Harris claims that after enucleation of the prostate he is able to unite the trigonal flap of mucous membrane to the torn end of the urethra. With such a technique healing is by primary intention. Moreover, he reconstructs the internal meatus. This technique ensures more rapid healing, and by preventing urine from coming in contact with tissues uncovered by mucous membrane reduces sepsis.

The post-prostatic pouch is obliterated by drawing down the base of the bladder to the level of the bed of the prostate with the aid of catgut sutures. Cysto-urethroscopy during the convalescent period shows that the new internal meatus is on the same plane as the interureteric bar. Thus there is no opportunity for urine to stagnate in the region of the ureteric orifices.

The control of haemorrhage is nearly complete, thanks to the method of suturing in and around the prostatic bed. Because of this successful haemostasis it is possible to close the bladder without suprapubic drainage. In about 50 per cent. of my cases there is no leakage of urine through the abdominal wall, and the healing therefore, both of the bladder and of the abdomen, is by primary intention. The appearance of the bladder base and reformed prostatic urethra during the first five weeks of convalescence is instructive. The urethroscope and cysto-urethroscope have been used for this investigation.

Towards the end of the third week the sutures around the new internal meatus separate and the knots are washed away by the act of micturition. The mucous membrane is slightly oedematous, but otherwise healthy, and there is no evidence of sloughing.

If at the operation there has been failure to unite the trigonal flap to the torn end of the urethra, as has already been stated, healing is by secondary intention. The amount of scar tissue formed is dependent on the extent of the separation. In my cases this has varied from half a centimetre to one millimetre.

It is surprising how slowly this raw area becomes covered with scar tissue. The abdominal wound is firmly healed and micturition has become almost normal before union between bladder and urethral mucous membrane has taken place. This lapse of time is anything between the twenty-first day and the sixth week after operation.

These observations show that the patient after prostatectomy, however quickly his abdominal wound may heal, must not be considered convalescent until the end of the second month. Moreover, pyuria and frequency of micturition will persist so long as there is an internal wound.

Advantages of the Harris Technique

With Harris's technique can it be stated truthfully that progress has been made? I believe I was his first disciple in England, and from my own experience I know he is right when he states: There is complete and immediate control of haemorrhage by suture. He also states that the prostatic cavity is obliterated. I cannot agree that his technique as described in the *British Journal of Surgery* always accomplishes this desirable result. The post-operative recurrence of obstruction is definitely obviated.

Harris, with a total of 371 prostatectomies, claims a mortality rate of 2.7 per cent. St. Peter's Hospital, with a total of 2,691 from 1901 to 1929, had a death rate of 9.9 per cent. All these cases were operated on either by the Freyer or the Thomson-Walker technique. So far Harris has a fine record. Time alone will show whether his present mortality figure can be maintained at the same level when he has performed his thousandth prostatectomy.

Since January, 1934, I have made a careful study of the Harris technique at St. Peter's Hospital. It is not necessary to discuss the full details of the operation, as they have been recorded in a number of journals since the original paper was written in 1927. My purpose is to consider the principles which underly this new method of trying to overcome the dangers of prostatectomy, and to suggest minor alterations in technique which I believe are necessary.

No surgeon should leave a raw surface exposed to the secretions or excretions of the body if it can possibly be avoided. His aim is to cover up that surface with nature's protective agent. In other words, he desires that the wound which he has produced shall heal by primary union. So far as prostatectomy is concerned it has always been thought impossible to completely cover over the raw surface of the bed of the prostate with mucous membrane. Harris now shows that this view is entirely erroneous. Moreover, he has demonstrated the feasibility of reconstructing the internal urinary meatus after it has been damaged during enucleation of the prostate.

Minor Modifications of the Method

From the description given in the *British Journal of Surgery* of this new method, it would seem that the principal part of the operation is carried out without direct illumination. Perfect visibility is just as important as an accurate tactile technique. It is believed that this has been accomplished by electrical illumination within not only the bladder but also the prostatic cavity. The bladder retractor with its electrically lit blades is now well known to the large majority of urologists. The one which I have devised is an improvement on all others in that the blades are fenestrated and the posterior retractor so curved as to prevent bulging of the wall in front of the pouch of Douglas. A full description of this instrument was given in the *British Medical Journal* (April 14th, 1934, p. 669).

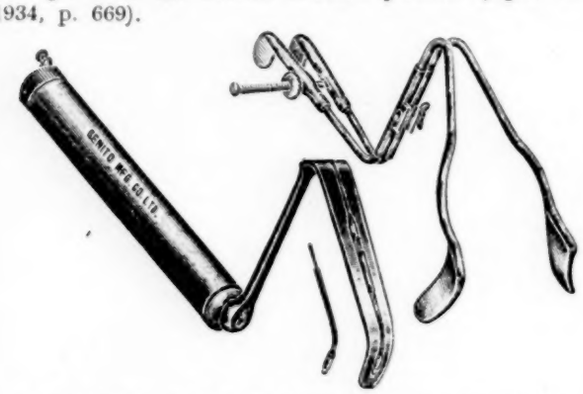

FIG. A.—The anterior illuminated retractor and prostatic speculum.

FIG. B.—The prostatic speculum attached to the anterior illuminated retractor.

The anterior retractor used by Harris for exposing the prostatic bed has been altered so that it can carry an electric bulb on the end of it. Experience has shown that even this increase in illumination is insufficient for accurate observation inside the prostatic cavity. I have designed a new instrument which, for the sake of convenience, may be called the prostatic speculum (see Figs. A and B). Attached to the anterior illuminated retractor are two blades, which, on being inserted into the prostatic cavity, can be widely separated from one another. This manœuvre leads to the dilatation of the passage between the torn edges of the bladder mucous membrane and the triangular ligament. In this way the rays of light from the anterior retractor are amplified by those within the bladder. Thus perfect visibility is obtained of the tissues which form the bed of the prostate. Equally important is the fact that the prostatic surface of the triangular ligament, together with the fractured ends of the urethra, can be clearly observed. One other advantage may be obtained from this instrument. During the plastic part of the operation it is an obvious advantage to preserve haemostasis. The removal of blood by swabbing in such a small space as the prostatic cavity hinders the surgeon, and suction in this situation, though an invaluable method for the bladder, has not been found a success. The blades of the speculum, therefore, have been so shaped that they compress the vessels which bleed from beneath the lateral flaps surrounding the entrance to the prostatic cavity.

The theatre should be darkened while the bladder and prostatic cavity are flood-lit. This enables the surgeon to observe accurately the anatomical structures in the operation area.

It is my practice to enucleate the prostate by the intra-urethral method, but without a finger in the rectum as advocated by Harris. The object of the latter manœuvre is to aid enucleation, but I have dispensed with it for many years. Moreover, even with a glove covering the hand and removed immediately after the tumour mass has been separated, contact with the anus invites infection. Harris maintains that by his technique the mucosal covering of much of the prostatic urethra remains intact. As yet there has been failure to support this claim, and only in quite a few cases has it been possible to approximate by suturing the mucous membrane of the trigone to that of the urethra.

A criticism which has been put forward on many occasions is that the stitches which bind the trigonal flap of the mucous membrane to the prostatic bed and the torn edges of the urethra are likely to be passed into the lumen of the rectum. The instrument used for this suturing is the boomerang needle. Harris insists that the needle must be inserted behind the interureteric bar. It is at this point that the thickness of the tissues between the bladder and the rectum is greatest. The thinnest portion is in the centre of the prostatic bed. The needle is so curved that when pushed home by the spring in the handle its point is directed during the whole manœuvre away from, and not towards, the rectum. He will be a clumsy surgeon and incapable of using the boomerang needle intelligently who inserts these sutures into the rectum.

I have had the experience on a few occasions of the posterior median stitch cutting through the tissues of the prostatic bed. In some old men they are extremely friable. Even gripping forceps, whether of the Harris or Morson pattern, under such conditions bely their name. In an increasing number of cases I find that these instruments are not needed, their place being taken by the prostatic speculum, which stretches transversely the floor of the cavity and at the same time raises it up to the level of the trigonal flap.

It has already been emphasized that the union of this flap with urethra is only possible of consummation if the growth in the prostate has so developed as to surround only a small part of it. When this occurs care must be taken that the posterior stitch, in joining together bladder and urethral mucous membrane, is not passed through both walls of the tube, for after this is tied it is impossible to pass any instrument into the bladder.

Another danger to be avoided is occlusion of the ureteric orifices with the postero-lateral sutures. The latter should be inserted wide of the interureteric bar.

In the completion of the reconstruction of the internal meatus Harris uses one or more transverse sutures, which bring together the torn edges of mucous membrane surrounding the bladder end of the prostatic cavity. These stitches are intended to be not only reconstructive, but also haemostatic, for a number of blood vessels are torn across in this region during enucleation. Their temporary control can be maintained by the pressure of the blades of the prostatic speculum (Figs. 2 and 3).

I have found that the transverse suture *per se* is not completely haemostatic, and, as Harris points out, individual vessels have often to be ligatured. This can

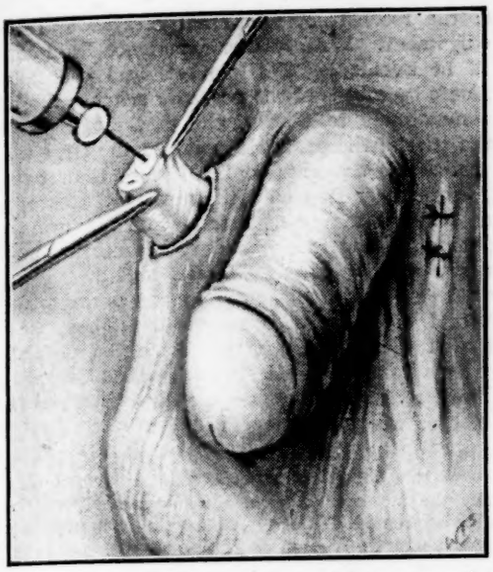

FIG. 1.—A drawing to show the vas deferens exposed and divided in the upper part of the scrotum. A hypodermic needle has been inserted into the proximal end for irrigation of the seminal vesicle with 1 in 60 carbolic acid.

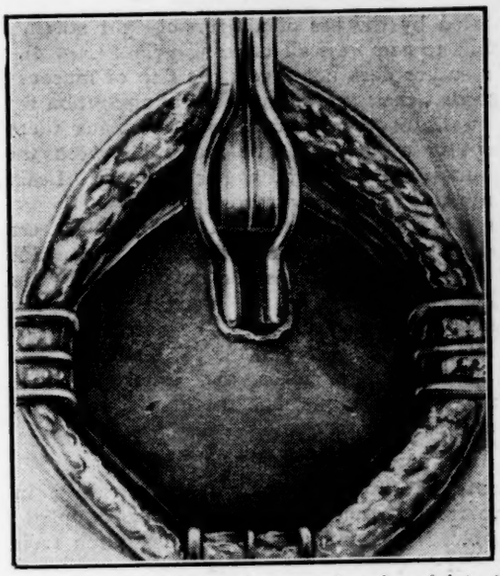

FIG. 2.—The prostate has been enucleated, and into the cavity has been inserted the anterior illuminated retractor, together with the prostatic speculum.

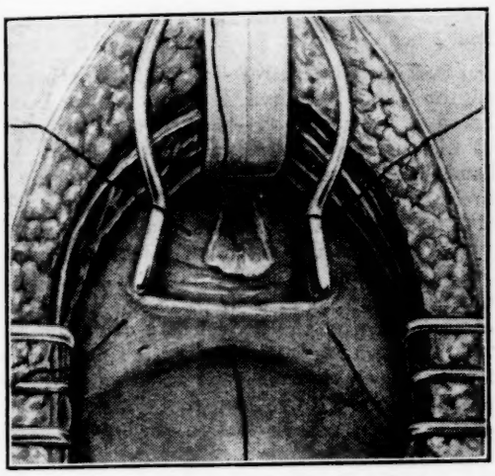

FIG. 3.—The blades of the speculum have been separated so as to expose the floor of the prostatic cavity and the torn end of the prostatic urethra. Note that the three posterior stitches have been inserted

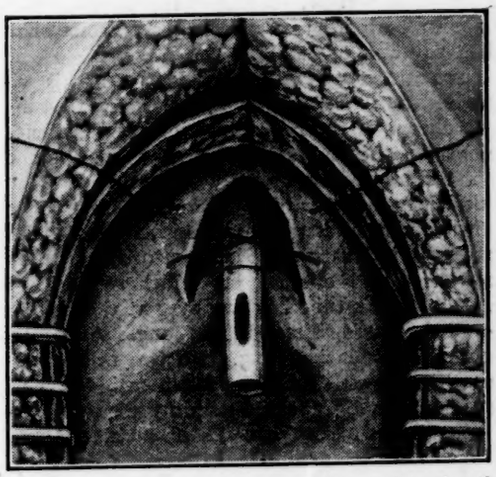

FIG. 4.—The urethral tube in position after the three posterior stitches have been tied. The figure-of-eight suture has been inserted.

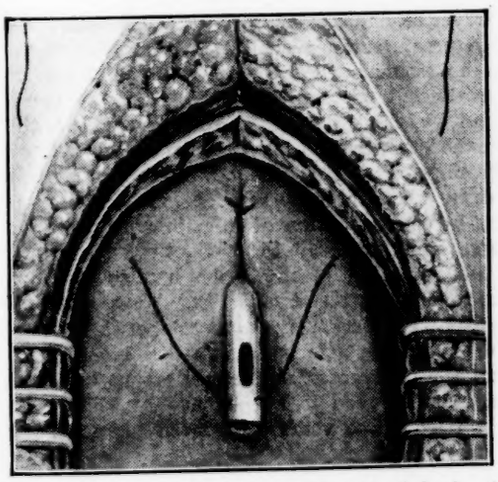

FIG. 5.—The figure-of-eight stitch has been tied. A suture has been passed through the catheter, lateral walls of the bladder, and the abdominal wall (the anchoring stitch for the urethral catheter).

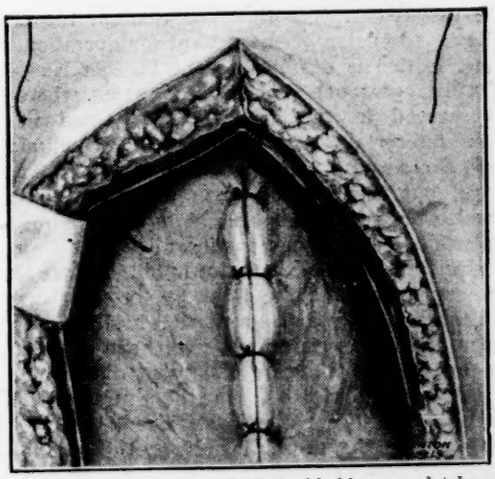

FIG. 6.—The anterior wall of the bladder completely sewn up. The anchoring stitch can be seen protruding through the skin of the abdominal wall.

be obviated by the use of a figure-of-eight stitch, which never fails to compress all bleeding points (Fig. 4). Also Harris's suture does not invert the flap of mucous membrane so that their raw surfaces are in apposition with the fibrous walls of the prostatic cavity. Thus there is a tendency for a pocket to be formed between the new internal meatus and the triangular ligament. Leakage of urine into this space may cause cellulitis.

With the figure-of-eight stitch the flaps are certainly inverted, but I am not satisfied that even this modification of the technique overcomes the defect in all cases. By control of haemorrhage we are brought a step nearer the attainment of primary union of the anterior bladder and abdominal walls (Figs. 5 and 6). The advantages of this to the patient are immense, and Harris, by the introduction of his technique, has shown that it can be done with success.

After-treatment

Patients after prostatectomy now convalesce in comparative comfort, unencumbered by large drainage tubes, leaking blood, pus, and urine. The Hamilton Irving box in the past has played its part as well as any such contrivance could, but I am thankful that no patient of mine will ever have to use again so undignified an apparatus. I have pointed out elsewhere that the suprapubic tube is the handmaid of sepsis. Gone should be the days when surgeons have to combat secondary haemorrhage from the abdominal wall or prolapse of bladder mucous membrane through a suprapubic fistula.

I am in entire agreement with Harris in his view on after-treatment. It is my practice to insist that whoever will be in charge of the patient during convalescence shall be present at the operation, so that the aim of the surgeon's technique can be fully appreciated.

The difficulty of obtaining a urethral tube of correct lumen throughout its length has been as great in England as, apparently, in Australia. The Genito-Urinary Company have now produced one for me which conforms to my requirements. This tube has two eyes at the bladder end, is thin-walled, and is sixteen inches long. All other tubes have been thirteen inches long. No two urethras are the same length, and with the old-pattern catheter the funnel end has sometimes disappeared within the external meatus. Harris recommends size No. 22 French. Any larger causes urethritis.

Some Complications and their Avoidance

Unfortunately, we have not yet reached the stage when we can be certain of eliminating sepsis, either before or after operation. So far as hospital practice is concerned it is the exception rather than the rule for the urine to be sterile on admission of the patient for operation.

If the infection is confined to the bladder lavage may cause its disappearance, but in those cases where sepsis has commenced in the kidney, as is usual in colon bacilluria, no certain remedy exists for its elimination. Therefore the surgeon commences his operation at a disadvantage, but the risks of post-operative complications are considerably reduced if he adopts a technique which first controls haemorrhage, secondly, allows for drainage of the bladder to be downhill and not uphill, such as happens with the suprapubic tube, and thirdly, blocks the passage of organisms to the vesiculae seminales and testicles.

Division of the vas guarantees avoidance of epididymo-orchitis, but I am not aware of any method which safeguards the seminal vesicles. In the operation which I perform an attempt is made to sterilize these tiny reservoirs as well as the urethra, before enucleation of the prostate is commenced, by irrigation, via the proximal end of the divided vas, with 1 in 60 carbolic acid (Fig. 1).

I have already alluded to the danger of a technique which permits of the formation of a pocket, however small, between the reconstructed internal meatus and the triangular ligament. With further experience I am confident this will be avoided. This pocket, and the failure to approximate by means of the posterior stitches the bladder mucous membrane to that of the urethra, leaves a raw surface of part of the prostatic bed. In the large majority of my cases this amounts to little more than two millimetres, as demonstrated with the cysto-urethroscope, but, however small it may be, directly infected urine passes over it there is danger of secondary haemorrhage. If the after-treatment advocated by Harris is faithfully followed there will be no fear of this complication taking place until the urethral tube has been removed. Then, when the patient micturates normally, will come the possibility of haemorrhage from the raw surface, which Semple and I have shown remains uncovered by mucous membrane for at least three weeks after operation.

In a series of cases studied at St. Peter's Hospital two examples of this complication occurred. Fourteen days after operation, the suprapubic wound being healed, the urethral catheter was removed. For twenty-four hours the urine passed per urethram was clear to the naked eye, though, as subsequent events showed, it must have contained bacteria. Then suddenly, on the fifteenth day, without any warning, so sharp a haemorrhage occurred as to necessitate the insertion of a drainage tube into the bladder through the recently healed suprapubic tissues. Attempts to clear the bladder of clots by urethral irrigation alone were a failure. Both patients rapidly recovered from the effects of this bleeding, which ceased two days later.

It must be stressed that reactionary haemorrhage—that is to say, the loss of blood which occurs for the first forty-eight hours after operation—need never cause anxiety provided the surgeon's technique is not at fault. On the other hand, the danger of secondary haemorrhage is not yet entirely eliminated, but it is slight compared with the constant apprehension which occurs in all other techniques. The progress made in this direction alone should lift such a load off the minds of urologists as will benefit their healths as much as that of their patients.

I am impressed with the perfect ease of urethral instrumentation in all cases operated on by the Harris technique. It must be confessed that until the adoption of this plastic operation there was always fear that difficulty might be encountered when catheterization or cystoscopy was needed. To-day the urethroscope, the cystoscope, and the gum-elastic catheter can be introduced through the urethra into the bladder without the least anxiety.

Three Landmarks in Prostatic Surgery

Those who have been in active practice from the days when Freyer launched his successful campaign on behalf of complete prostatectomy until the present time are in a position to estimate the progress made in the comfort of the convalescent patient. Prior to the great war he was exhausted by a steady loss of blood, sepsis within and without the bladder, and loss of sleep due to discomfort of wet dressings or the Irving box with its tight straps. Then came the Thomson-Walker era, which was conspicuous by the reduction of infection and better control of haemorrhage, but still the patient with a large suprapubic tube draining bloody urine had to put up a big fight to overcome his disabilities. Now, with primary closure a proved success, the contrast between the obvious state of exhaustion associated with the techniques of the past and the comparative fitness resulting from the most modern must be seen to be believed by those who have served a twenty-five years' apprenticeship in the surgery of the prostate.

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TREATMENT OF THE MALIGNANT PROSTATE

BY

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Whilst the treatment of urinary obstruction due to innocent forms of enlargement of the prostate has made great progress during the last twenty years, the treatment of obstruction due to carcinoma still remains disappointing. The fact that malignant disease of the prostate is by no means so rare a condition as was thought at the end of the last century makes our lack of progress particularly unfortunate. Exactly what is the ratio between innocent and malignant enlargement is difficult to determine, but various figures ranging from 13 to 25 per cent. have been given. The incidence of prostatic carcinoma is at any rate sufficiently high to justify a general survey of the present position of its treatment.

Surgical Treatment

This may be subdivided into radical and palliative, by radical treatment being implied an attempt to extirpate the carcinoma, and by palliative, surgical measures that limit themselves to relieving symptoms. As in the case of carcinoma elsewhere in the body complete removal of the carcinomatous tissue by the scalpel would be the ideal form of treatment. This being so, many attempts have been made during the last twenty years to cure carcinoma of the prostate by this means. Prominent among those who have made efforts in this direction has been H. H. Young of Baltimore. As an exponent of perineal prostatectomy, it was by the perineal route that his attack was carried out. In a paper published in the *American Journal of Surgery* (April, 1935) he analyses his results.

Fifty patients were submitted to operation and of these four died, giving an operative mortality of 8 per cent. Thirty-three of the survivors were alive and well five years or more after leaving the hospital, and thirteen had survived for a period of seven years or more without a recurrence. Eleven patients died with recurrences or metastases.

The statistics supplied by operators using the suprapubic route are less complete, and would appear to show less satisfactory results. Nevertheless Marion, writing in 1928, expresses the opinion that the suprapubic route is in no way inferior to the perineal for the removal of a malignant prostate. He points out that neither by the perineal nor by the suprapubic route can the lymphatic glands be dealt with, and the suprapubic permits of excision of the vesicles as easily as does the perineal. Most surgeons have come to the conclusion, however, that the results of radical operation are disappointing, and few are prepared to attempt it except in the earliest stages of the disease.

Lymphatic Spread

This abandonment of an ideal, although it may be unfortunate, is fully justified, for the fact that the lymphatics cannot be dealt with puts a narrow limit on the surgery of the malignant prostate. Had the surgery of the malignant breast been subject to the same limitations its results would have been equally poor. The secondary invasion of the lymphatics would appear to be as rapid in the case of the prostate as it is in the case of the breast. E. R. Mintz and G. G. Smith, in the *New England Journal of Medicine* of September, 1934, state that in sixty out of a hundred cases of malignant prostate examined in the post-mortem room there was an obvious involvement of the retroperitoneal glands. Pasteau also reports extension to the lymphatics in 80 per cent. of necropsies.

There is another point to be borne in mind when we survey the claims made by the exponents of the radical operation—namely, that carcinoma of the prostate is, as a rule, of very slow growth. It is by no means uncommon for a patient once he has been relieved of his obstruction to survive for a period of five years or more. As Young's series includes many early cases one cannot help speculating how long they would have lived had no radical operation been undertaken. Moreover, the fact that clinically no recurrence has been detected is no guarantee that such is actually the case, for who can be certain when palpating the indurated site of a prostatectomy that the induration is due only to the presence of fibrous tissue and not to the existence within that tissue of islands of carcinomatous cells?

In apparently discounting Young's results and his advocacy of radical operations, I have no desire either to show lack of appreciation of his brilliant surgery or to suggest that radical operations have no place in the treatment of the malignant prostate. I am simply emphasizing the fact that it is only the very earliest cases that are amenable to such a form of treatment. It is, above all, the secondary type of carcinoma—that is to say, the prostate which, once innocent, now arouses a suspicion of malignancy—that should be promptly extirpated. Recent statistics have shown that 14 per cent. of innocent enlargements suffer malignant change, so that even if surgery were confined to this type alone it would still have an important place in the treatment of malignant disease.

Early Diagnosis

Since success in surgery depends on early diagnosis it is important to know what signs should arouse a suspicion of malignancy. The most important is the presence of a hard area within the prostate. If this is discovered it can only be due to one of three causes: (1) a malignant deposit, (2) a prostatic calculus, and (3) a collection of distended acini surrounded by induration. The second of these three causes can be confirmed or disproved by an *x*-ray, and a pelvic radiograph should always be asked for. Not only is this necessary in order to exclude the presence of a calculus, but also in order to make certain that deposits in the bones of the pelvis do not already exist. Together with the vertebrae, the pelvic bones are the commonest site for secondary deposits. On three occasions in my experience, in spite of the fact that the diagnosis of carcinoma was in doubt owing to the insignificance of the signs noted on rectal examination, extensive disease of the pelvic bones was revealed by a radiograph. In one of these cases the nodule in the prostate was so small that had the patient not been examined under an anaesthetic it would probably have been missed.

A second sign of importance in diagnosis is induration of a vesicle. It is true that vesicular hardening is frequently found in association with an innocent prostate, but such a discovery should always be regarded with suspicion. The extraordinarily high incidence of vesicular extension in cancer of the prostate has long been known, and Young and Frontz have estimated that this organ is invaded in forty-two out of sixty-three patients operated upon for malignant disease of the prostate.

Prostatic Secretions

The third aid to early diagnosis, the value of which has not yet been confirmed by other writers, may be the character of the expressed prostatic secretions. S. W. Mulholland, in the *Proceedings of the Staff Meetings of the Mayo Clinic* (December 16th, 1931), states that if the secretions obtained by massage from a malignant prostate are examined microscopically they will be found to contain a cell which is about two or three times the size of an ordinary polymorphonuclear leucocyte. These large cells tend to occur in clumps, and they are often so closely packed together that their outline is distorted. This observation of Mulholland's has not received much attention, and it is to be hoped that other observers will confirm or contest it. Difficulty is sometimes experienced in differentiating a fibrous prostate from one that is the site of scirrhous carcinoma. The characteristic cell obtained by massage of a fibrous prostate is the leucocyte, and if these clumps of larger cells can be shown to be pathognomonic of carcinoma, examination of the expressed prostatic fluid should prove a valuable aid to differential diagnosis.

Such well-known characteristics of the malignant prostate as fixation, asymmetry, disappearance of the central sulcus, and changes in the overlying vesical mucosa seen through the cystoscope occur, of course, so late that they are of little value in establishing an early diagnosis.

Once the suspicion of malignancy has been aroused immediate operation is indicated, however trifling may be the symptoms of which the patient complains. In cases where the surgeon is so much in doubt that he hesitates to advise an immediate operation, he would be well advised to insist on an examination under an anaesthetic, since with good muscular relaxation a more careful palpation and appreciation of the texture of the prostate can be obtained.

Operative Technique

It is usually the prostate that has started as an innocent one and undergone malignant change that is subjected to removal. In this type of case infiltration of the capsule occurs later than in a primary carcinoma starting in the posterior lobe. Even if the prostate cannot be enucleated entirely by the finger it can generally be removed by a combination of enucleation and dissection. Sometimes it is the difficulty in enucleation and the cartilaginous feel of the prostate that confirms what, up till that moment, has been only a suggestion of malignancy. When this happens every effort should be made to remove not only the whole of the gland but also the vesicles, since extension to these structures occurs early in the disease.

Surgery and Radiotherapy

The question arises whether, after extirpation of a malignant prostate, treatment by means of radium or deep *x*-ray therapy should be instituted. It is almost certain that, if the prostate has proved difficult to enucleate, the prostatic capsule itself will be the site of malignant infiltration. The treatment of this residual focus is therefore a necessity if the patient is to be safeguarded from an early recurrence. Two methods of treating the capsule are possible: radium and deep *x*-ray therapy. I agree with Marion when he states that a satisfactory introduction of either needles or radon seeds into the capsule is not only difficult after prostatectomy but also gives very poor results. I have not found, however, that rapid extension is encouraged by such treatment. But whilst there are difficulties in applying radium to the capsule there are none attached to the use of *x* rays, and a course of deep *x*-ray therapy should be prescribed as soon as the patient has recovered from his operation. At present it is too early to be able to assess the precise value of supplementary deep *x*-ray therapy, but since employing it I have had none of those rapid recurrences of symptoms that previously made the removal of an obviously malignant prostate so disappointing a procedure.

Treatment of Inoperable Carcinoma

In these cases surgery is confined to the relief of obstruction. Advances in the technique of per-urethral resection have placed at our disposal a measure that has many advantages over the establishment of a permanent suprapubic drain. Patients show marked differences in their reaction to a suprapubic drainage tube. At one end of the scale are those who readily accept its imposition, and may even assert that the artificial method of emptying their bladders is as satisfactory as the natural one. At the other are the patients who complain that they would sooner die than continue to live with such an encumbrance. These differences depend not only on the social position of the sufferer, his enjoyment of leisure, and his possession of the means of obtaining good nursing, but also on his psychological make-up. It is therefore an advantage to be able to offer the alternative of an attempt to restore natural micturition by means of a per-urethral operation. Only one condition must be satisfied in order to make this possible—namely, that the urethra should admit the passage of a McCarthy electrotome. Distortion of the prostatic urethra is often more marked and always more unyielding in the case of a malignant than in that of an innocent prostate, and as a result difficulty is often experienced in instrumentation. Sometimes this can be overcome by means of a preliminary dilatation with metal bougies, but it may necessitate the use of an instrument of smaller calibre than that usually selected. It has been advanced as an argument against attempts to restore micturition by per-urethral resection that cutting through malignant tissues with a diathermy current may stimulate the growth of the carcinoma. This objection is, however, a theoretical one, and there is nothing to lead one to suppose that it is of practical importance. Experience does not show that resection provokes activity in the growth, and as a rule the sufferer from a malignant prostate supports his operation well. Haemorrhage is less likely to prove a complication than in the case of an innocent enlargement, and since carcinoma of the prostate is usually of slow growth, early obliteration of the channel is not often noted. It must, of course, be realized that restoration of micturition by per-urethral resection is generally only attempted in the scirrhous type of malignant prostate, where the total increase in volume is small and the extension of growth slow. For the larger type of prostate suprapubic drainage is preferable.

Surgical Relief of Pain

Some reference should be made to surgery undertaken purely for the relief of pain. The amount of pain occasioned varies markedly in different individuals, and sometimes, when nerve trunks are involved, may become agonizing. For the relief of pain in such cases two procedures have been advocated: resection of the presacral nerves and chordotomy. In my experience the results of the first-named operation are erratic and unreliable, as is to be expected when we consider how different may be the causes of the pain. It is only by

chordotomy that complete freedom from pain can be promised, but as the operation is a severe one it should be reserved for exceptional cases. In my own experience the necessity for chordotomy has only arisen once.

Treatment by Radiotherapy

Two alternative lines of treatment are here available: radium and deep *x*-ray therapy. If the former be selected the radium is applied as needles or as radon seeds, inserted into the substance of the gland, the old methods of application by means of a receptacle in the posterior urethra or rectum having been abandoned. I prefer to insert seeds by means of an introducer thrust through a perineal incision. It must, however, be confessed that the results are disappointing, and Young's comment that "in some cases the duration of life appears to be distinctly lengthened, and it may be that a few cures have been obtained" represents the optimum to be expected.

A more promising line of treatment is by means of deep *x*-ray therapy. Writing in the *Journal of Radiology* in 1926, Sir John Thomson-Walker published an account of forty-eight cases of malignant prostate treated by means of massive doses of *x* rays. In five of these cases fairly advanced carcinomata disappeared for a sufficiently long time to encourage the hope that they would not recur. In another fifteen cases a temporary improvement was produced followed by recurrence, making altogether twenty cases, or 41.6 per cent., where the growth was profoundly altered by the *x* rays. Since the publication of Thomson-Walker's paper great advances have been made in the technique of this form of treatment, and I believe that with these advances there will be an equal improvement in the results obtained. That this opinion is not supported by statistics in the present paper is due to the fact that the number of malignant prostates I have submitted to modern methods of deep *x*-ray therapy is not yet sufficient (some dozen cases) to justify the publication of statistics, nor can I find reliable figures from other sources with which to supplement these. But although figures are at present lacking it is still possible to draw certain conclusions on the subject.

Conclusions

The first of these is that, if possible, patients should be referred to the radiologist without having been submitted to suprapubic drainage. The presence of a drainage tube and the inevitable infection of the bladder associated with it adds enormously to the discomfort of the reaction provoked by the treatment. If the difficulty in micturition or the amount of residual urine is such that relief of the obstruction is necessary, per-urethral resection is infinitely preferable to suprapubic drainage. Another conclusion that can be drawn is that there exist wide variations in the response of different patients. I have had two advanced cases of malignant disease which when examined two months after the conclusion of a course of deep *x*-ray therapy appeared to have normal prostates. Other cases treated by the same radiologist, with the same intensive doses, remained exactly as they were, even though some improvement in symptoms had been noted. What determines this difference, and whether it lies in some unknown factor in the patient himself or in some difference in the radio-sensitiveness of the cancer cells, it is impossible to say. Perhaps, as Thomson-Walker has stated in the publication already referred to, some means will be found of estimating the radio-sensitiveness of a patient so that unpromising cases may be spared the disappointment of an ineffectual and irritating treatment. It is indeed to be hoped that closer co-operation between the urologist and the radiologist will lead not only to a more accurate estimation of the value of radiotherapy in carcinoma of the prostate, but also to an actual improvement in the technique and management of the cases during treatment. In the meantime, I believe that radiotherapy is the most valuable agent at our disposal in the treatment of inoperable carcinoma of the prostate, and is, too, a valuable supplement to surgical removal.

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PROSTATIC RESECTION

A SIMPLIFIED TECHNIQUE

BY

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Having performed diathermic resection by the suprapubic route in ten cases, with apparently completely satisfactory results, I feel encouraged, in spite of the small number of cases, to place a short description of this simple method of prostatic resection on record. It has occurred to me that it might prove of interest to those surgeons who, through lack of the requisite type of operating cystoscope or of sufficient opportunities to acquire skill in cystoscopic methods, feel themselves unable to carry out the orthodox operation per urethram. It has been my experience that about 40 per cent. of cases of prostatic obstruction are not fit to stand the shock, sepsis, and loss of blood entailed in the performance of a complete prostatectomy at the time when they first come to a surgeon for advice. Perhaps half of these are unfit as the result of exceptional delay in seeking advice for their urinary difficulty. The remaining half may be unfit from a variety of other morbid conditions which, either alone or in conjunction with the results of prolonged urinary back-pressure, render them definitely unfit for radical operation by any method.

I have found that the use of the diathermic method of partial resection allows about half of these otherwise inoperable cases to receive the benefit of surgical relief without subjecting them to any unduly high risk. The greatly diminished shock, the lessened post-operative pain, the almost complete bloodlessness of this operation, and the very small area of damaged bladder surface are the factors which contribute to the greater safety of diathermic methods in cases presenting high surgical risk. Perhaps the largest single factor contributing to the low mortality of this type of operation is the lessened element of septic absorption resulting from the small area of damaged tissues and the fact that all the vessels and lymphatics are automatically sealed during the process of resection. This is evidenced by the smooth and afebrile convalescence enjoyed by all the cases I have so far dealt with.

Pre-operative Treatment

In preparing the patient for operation, cases requiring preliminary drainage should have this done by the use of a urethral catheter in preference to the employment of a suprapubic tube if they are destined to have their prostates resected by the suprapubic route. My reason

for stressing this point is that I have found in cases where suprapubic drainage has been in operation for more than a few days that the resultant thickening and fibrosis of the abdominal wall and shrinkage of the bladder renders adequate exposure of the prostate at the time of operation much more difficult.

Operative Technique

Having got the patient into the best possible condition the bladder is opened by a 3-inch suprapubic incision and a four-blade bladder retractor is then inserted. An illuminated retractor is advisable, but not essential. The bladder being well spread open, the assistant inserts his right forefinger into the rectum and pushes the prostate up as far as possible. A cone-shaped speculum, cut away on one side, is then inserted into the prostatic urethra, and held in position by means of a clamp, the terminal three inches of which, including the jaws, is set at right angles to the handle. The speculum I have used has been of metal, and about two inches in diameter at the mouth of the cone, but I think that ivory, being a better non-conductor of heat, would be preferable. The terminal half-inch of the speculum is solid, bluntly pointed, and 1 cm. in diameter. This allows the operator to push it well down through the prostatic urethra until the point is felt to enter the membranous urethra.

The operator controls the speculum by means of the clamp in his left hand, while manipulating the diathermic knife in his right. The assistant also has his left hand free to help control the position of the bladder retractor. The speculum effectively protects the anterior and antero-lateral walls of the urethra, while the middle posterior lobe, or median bar, and part of the lateral lobes of the prostate project into the cut-away portion of the speculum. The operator then proceeds to remove all that portion of the prostate uncovered by the speculum by means of the diathermic knife. I have tried two forms of electrode for this purpose: a thin wire loop designed to cut the tissue away in thin, clean slices, and a thin flat spatula-type of electrode similar in shape to a narrow tenotomy knife, but, of course, quite blunt on all edges and at the point. Using this latter type of electrode the process is one of coagulation, the electrode being applied until coagulation to a depth of 3 to 5 mm. is obtained. The coagulated tissue is then removed with a blunt spoon curette and the electrode reapplied to carry the process another 3 to 5 mm. deeper. In the case of a fairly large prostate this sequence of coagulation and curettage will have to be repeated about four times. I have so far found this method more satisfactory than the cutting loop, as, owing to the accumulation of moisture in the cone of the speculum and the fibrous nature of the tissue to be sectioned, cutting has not been very satisfactory.

A fairly accurate idea of depth can be obtained by palpating on to the tip of the assistant's finger in the rectum, through the remaining thickness of prostatic tissue and rectal wall. Another indication that sufficient has been removed, or that the limits of safety are nearly reached, is the appreciation of a distinct feeling of warmth by the finger of the assistant when the electrode is applied to the bed of the resected area. Care must be taken to allow for subsequent sloughing of another layer of tissue after the final curettage. This is likely to take place about six to eight days after the operation. Having completed this resection the speculum is withdrawn, and a large rubber catheter is passed into the bladder through the urethra and secured by a stitch through the preputial skin. The suprapubic wound and bladder are then closed, in separate layers, round a half-inch drainage tube. Drainage of the cave of Retzius is not required.

Post-operative Treatment

During the first post-operative week the bladder is washed out every one or two hours with a solution of 5 per cent. sodium citrate, a glass container of this fluid being hung at the side of the bed and connected by a tube and control clip to the urethral catheter. This solution seems to dissolve coagulated tissue and any small blood clots, and allows of drainage through a comparatively small suprapubic tube. At the end of a week or ten days, if the urine and wash-out fluid have become quite clear, the suprapubic tube is withdrawn and the wound allowed to heal, the catheter being retained in position until the suprapubic wound no longer discharges any urine.

I have performed this operation on only ten cases to date, but of these every one was a bad surgical risk, and every one has been dry, soundly healed, passing his urine freely and naturally, and ready for discharge from hospital in less than four weeks—several of them in less than three weeks.

Commentary

Failing cystoscopic diathermy, this operation seems to be positively indicated in cases of obstruction due to a small fibrous prostate or median bar, but it also seems quite satisfactory for cases of obstruction due to ordinary adenomatous enlargement which, for any reason, may be considered just too bad a risk for ordinary complete prostatectomy. I have not had any opportunity of trying it in cases of malignant prostate, but it appears possible that it could be employed in some of these cases to relieve the victims from the added miseries of suprapubic drainage during their remaining few months. I do not claim any originality for this simple little operation; it may have been practised and described before, but I have never seen any such description. The operation seems so simple, takes such a short time to do (generally about twenty minutes), is followed by such a comfortable, short, and uneventful convalescence, that I feel that it may have a definite future. Certainly the number of cases is far too small to give any indication of operation mortality, but so far I have not had the misfortune to have to record any fatality; nor have there been any complications in any way attributable to the method of operation during the post-operative period in hospital. In fact, complications of any kind have been conspicuously absent.

The earliest cases were operated on about two years ago, and so far I have not heard of any recurrence of obstruction, although they were all instructed to return and report any subsequent difficulty which might arise after their return to their occupations.

[Since writing the above I have had one case of delayed healing, due to slough formation in the suprapubic wound. This was a case which had been draining by suprapubic tube for several months, and therefore was not an ideal case for this method of treatment.]

E. Meulengracht (*Nord. Med. Tidsskrift*, November 30th, 1935, p. 1961) reports encouraging experiences with a liberal dietary of bread and butter, oatmeal porridge, milk, cocoa, and tea for the lesser meals of the day, and meat, fish, omelettes, fruit, potatoes, and other vegetables for the main meal of the day, from the time of the patient's admission to hospital for haematemesis and malaena, however severe they have been. Since he abandoned the conventional starvation treatment of these conditions in 1931, the author has dealt with 255 cases of severe haematemesis and melaena up to April 1st, 1935. He reduces his 255 cases to 220 cases of uncomplicated ulcer haemorrhage by the elimination of cases of cancer of the digestive tract and of varicose veins of the oesophagus associated with cirrhosis of the liver. Among these 220 cases there were only three which terminated fatally as a sequel to the haemorrhage. The author compares this very low mortality rate with the 10 per cent. figure for the conventional inanition treatment. He remarks that the comparatively high mortality associated with the inanition treatment is largely due to general exhaustion promoted by the anaemia, which is accentuated by an inadequate supply of food and drinks. The author's liberal dietary is supplemented by a teaspoonful three times a day of a mixture containing sodium bicarbonate, magnesium subcarbonate, and extract of hyoscyamus; also by a 0.5 gram tablet of iron lactate taken three times a day. He claims that this treatment reduces the mortality and shortens convalescence.

SYNTHETIC MAGNESIUM TRISILICATE

ITS ACTION IN THE ALIMENTARY TRACT

BY

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It has been shown in an earlier paper* that hydrated silicates of magnesium possess antacid and adsorbent properties reaching a maximum in the trisilicates and becoming negligible in the tetrasilicates or talc series. A synthetic trisilicate approximating in composition to the idealized formula of sepiolite or meerschaum was found to be far more active in these respects than any other silicate examined. Its adsorptive range for toxic and other substances was described. The present research relates to its behaviour in the alimentary tract.

Interaction with the Acid of the Gastric Juice

Normal gastric juice corresponds approximately in strength to N/20 hydrochloric acid. Hydrated trisilicate of magnesium reacts with such acid in accordance with the equation

$$Mg_2Si_3O_8nH_2O + 4HCl = 2MgCl_2 + 3SiO_2 + (n + 2)H_2O,$$

a proportion of the $(n + 2)H_2O$ being linked more closely with the SiO_2 than is here represented.

The process appears to be a complex balanced interaction between two hydrated colloids and two electrolytes. Magnesium trisilicate is insoluble in water. If left in contact with distilled water for a week and shaken repeatedly the subsequent filtrate does not give any of the usual reactions for magnesium and only a feeble coloration with magneson reagent (nitrobenzene-azo-resorcinol), which is sensitive to magnesium down to dilutions of 1 in 1,000,000. The silica resulting from the action is insoluble also, and the weight of silica recoverable by filtration after interaction with an excess of acid for a week is equal to that in the original magnesium silicate.

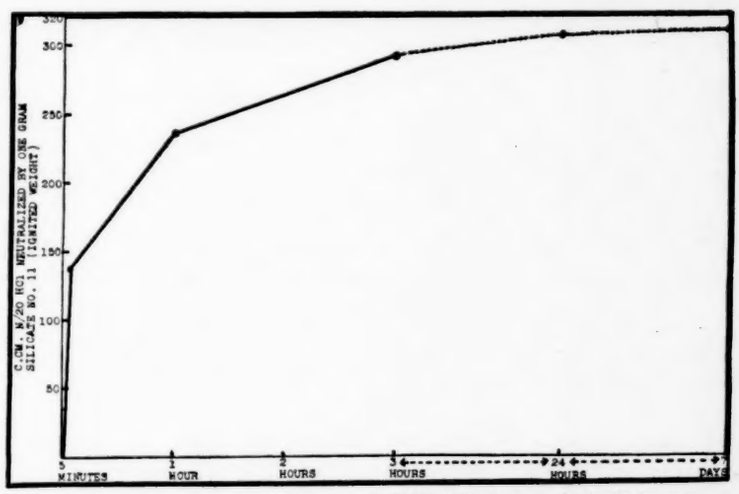

FIG. 1.—Progressive neutralization of N/20 HCl by synthetic hydrated magnesium trisilicate.

In the experiment 2.166 grams (ignited weight) of unheated magnesium trisilicate was treated thus. The ignited weight of the residue collected by filtration was 1.432 grams, and contained 0.5 per cent. only of magnesium and 1.425 grams of SiO_2. Analysis of the original trisilicate disclosed 66.3 per cent. of SiO_2 (ignited weight basis). The amount used, therefore (2.166 grams), should contain 1.436 grams of SiO_2, a figure agreeing reasonably well with the weight of the residue actually measured. A reaction in which one of the end-products (SiO_2) is thrown out of solution should proceed to completion. The conditions, however, are not so simple. Magnesium trisilicate and silica in the form evolved are active hydrated colloids, and the former, in the presence of acid, assumes the state of a colloidal gel, which hinders diffusion. With low dilutions of hydrochloric acid, completion is not achieved even in a week. Analysis of the solid residue at various stages gave the results in Table I:

TABLE I.—*Composition of Residue (Washed and Ignited) after Treatment of Synthetic Magnesium Trisilicate with Excess of N/20 HCl*

Time	Composition of Residue	
	Magnesium (Mg)	Silica (SiO_2)
	per cent.	per cent.
0 hours	17.5	66.3
3 „	3.6	89.3
24 „	1.1	96.6
1 week	0.5	96.8

At body temperature, and with hydrochloric acid of a strength comparable to that of gastric juice, 0.5 per cent. of magnesium remains in the solid phase, fixed either chemically or by adsorption. An appreciable time is required for the attainment of final equilibrium, but, as Fig. 1 shows, the reaction is substantially over in three or four hours.

Subject to a small correction, the total antacid effect can be calculated as equivalent to the magnesium content of the silicate. From the clinical view-point it is the slowness of the reaction which is of the greater interest. The duration of useful antacid action is approximately equal to that required for gastric digestion and to the usual interval between successive meals. The trisilicate thus offers the possibility of a sustained antacid therapy on a reasonably spaced system of dosage. The practical importance of the lag in neutralization made it desirable to obtain confirmatory evidence and measurement.

Equal volumes of N/20 hydrochloric acid were added to equal weights of the trisilicate, shaken repeatedly, and the residual acidity was estimated at intervals. Fig. 1 shows the successive amounts of acid removed by the silicate. A rapid initial neutralization accounted for about one-half of the magnesium, whilst most of the remaining half was used up in a slow secondary neutralization during the next few hours.

Interaction with Pepsin

Pepsin disappears quickly from solution after the addition of magnesium trisilicate. Various amounts of the silicate, ranging from 0.75 gram to 3 grams, were added to a series of tubes containing 10 c.cm. of 0.1 per cent. pepsin in N/20 HCl and filtered. Acid was added to 3 c.cm. of each filtrate until a darkening could be obtained with Congo red, and the volume of each was made up to 6 c.cm. by the addition of N/20 HCl. Fibrin was added to each and to control tubes of N/20 HCl and of the original pepsin solution proportionately diluted. After incubation and filtration the control with the original pepsin solution gave a strong biuret reaction, but the reaction was completely negative in every other instance.

* See *British Medical Journal*, January 25th, 1936, p. 143. The third and final article of the series will appear next week.

Distilled water in contact with synthetic magnesium trisilicate acquires a slightly alkaline reaction, *p*H 8.5. Pepsin is destroyed by even lower degrees of alkalinity, the critical *p*H being 7.25. It is unlikely, however, that such degrees of alkalinity could ever be induced in the stomach by the administration of reasonable amounts of the silicate to normal individuals, or to subjects with hyperchlorhydria. The following experiment was therefore carried out to ascertain whether pepsin is removed from solution by the silicate, even when a clinical degree of acidity is maintained in the suspending fluid.

To 100 c.cm. of 0.1 per cent. pepsin in N/10 HCl was added 2.3 grams of the silicate, and the mixture was tested with Congo red paper every few minutes. Whenever the neutral point was approaching through the interaction of the silicate and acid 1 c.cm. of N/1 HCl was added. This was required five times during one hour. After filtration the residual acid was estimated, and the mixture was made up to N/10 by further additions of N/1 HCl. A sample of the original pepsin solution was diluted with N/10 HCl to match the dilution undergone by that treated with silicate, and the pepsin potency of each was compared by the edestin method. It was found that pepsin had been removed equivalent to 27 mg. per gram of silicate (ignited weight basis).

Since the fluid contained active pepsin at the end of the experiment, and had never been allowed to become neutral, whilst its acidity had never been higher than N/10 HCl, the pepsin could not have been destroyed by any change in reaction, but must have been removed by the silicate. Pepsin removed by the silicate is not released when the silicate is decomposed with acid. Thus 2 grams of silicate were treated with a strong solution of pepsin, and filtered. After washing with distilled water the pepsinized silicate was suspended in N/10 HCl, and acidity to Congo red was maintained by the periodic addition of a little N/1 HCl for three-quarters of an hour. The filtrate from this was tested for pepsin with edestin against suitable control solutions with completely negative results. Possibly the pepsin does not pass into solution, because it is still adsorbed by the silica produced by the action of the acid on the silicate. From considerations of hydrion concentration it would seem probable, however, that the pepsin after removal is destroyed in the surface layer of the silicate.

Interaction in the Small Intestine

After the ingestion of magnesium trisilicate the small intestine should receive a magma of hydrated silica in a gel condition (formed during the interaction of the silicate and the hydrochloric acid of the gastric juice), mixed with a significant proportion of magnesium trisilicate which has escaped decomposition in the stomach by reason of the neutralization lag already discussed. Unsplit magnesium trisilicate, even after admixture with an excess of adsorbable material, retains useful adsorbent properties, because, as in the case of neutralization, the process of adsorption is affected by a considerable lag. The relative proportion of the trisilicate saturated in three hours varies with the concentration of the adsorbate in the surrounding fluid.

In Table II a representative series of estimations is given of the amount of dye taken up from aqueous solutions of methylene-blue at three different concentrations after contact with the silicate for various lengths of time. In these instances more than 50 per cent. of the adsorption potentialities of the substance remained unsatisfied after three hours, from which it is reasonable to infer that, with suitable dosage, adsorption by magnesium trisilicate continues throughout the length of the small intestine.

TABLE II

Dye Solution	Weight of Dye (mg.) Adsorbed by 1 gram of Synthetic Magnesium Trisilicate	
	After 3 Hours	After 1 Week
No. 1	51	129
No. 2	75	209
No. 3	110	244

TABLE III

Original Dye Solution Methylene-blue	Concentration of Dye (after 7 days) in Residual Supernatant Fluid		Weight of Dye Adsorbed (mg.) per gram of Synthetic Magnesium Trisilicate	
	Distilled Water	0.3 % $NaHCO_3$	Distilled Water	0.3 % $NaHCO_3$
per cent.	mg. per litre	mg. per litre	mg.	mg.
0.1	0	0	100	100
0.2	280	200	172	180
0.3	560	510	244	249

The alkaline reaction of the upper jejunal contents may possibly affect the range of substances taken up, but in the case of methylene-blue it does not sensibly alter the amount of dye adsorbed. In Table III are given comparable figures for adsorption of methylene-blue in distilled water and in a 0.3 per cent. aqueous solution of sodium bicarbonate respectively at various concentrations of dye.

Hydrated Silica

This substance enters the duodenum in the form of a gel, and, as shown in an earlier paragraph, the dried weight of silica produced by the action of weak acid on magnesium trisilicate corresponds with that of the silica present in the original unsplit molecule. Silica-gel has no antacid properties, but, as formed by the decomposition of magnesium trisilicate, it possesses great adsorbent power for application in the small intestine. Its behaviour has been studied in relation to a typical food poison, a dye, and a digestive ferment.

TABLE IV

Adsorbent	Weight of Methylene-blue Adsorbed at Saturation Point by 1 gram of Adsorbent (Ignited Weight)
	mg.
Hydrated silica from interaction of acid and magnesium trisilicate:	
Specimen 1	87
Specimen 2	90
Flowers of silica-gel (commercial) ...	46
Purified kaolin	14
Magnesium trisilicate (synthetic) ...	244

The substance was prepared by leaving synthetic magnesium trisilicate in contact with an excess of N/20 HCl for a week. The residue was washed and dried. It contained less than 0.5 per cent. magnesium. In this form it readily removed methylene-blue from aqueous solution. The details are given in Table IV, with comparable estimations for commercially prepared silica-gel, purified kaolin, and the original magnesium trisilicate respectively.

When left in contact with distilled water it does not affect the *p*H of the water perceptibly, so that pepsin adsorption tests can be carried out without fear of destruction of the ferment by alkalinity. Thus 2 grams were added to 50 c.cm. 0.1 per cent. pepsin in N/20 HCl. The fluid was still acid to Congo red at the end of one hour, when it was filtered, and the pepsin remaining in the filtrate was estimated by the edestin method. It was found that 1 gram (ignited weight) of the silica had removed 44 mg. of pepsin (*B.P.*)

Silica residue after treatment with pepsin in this way becomes activated and capable of digesting proteins. Such a sample was washed with N/20 HCl until the washings ceased to show any peptic activity. The washed pepsinized silica residue was incubated with fibrin in 20 c.cm. of N/20 HCl. Sufficient fibrin was digested in three-quarters of an hour to give a biuret reaction. A control flask of untreated silica residue suspended in 20 c.cm. N/20 HCl, which had been used as the final washing fluid for the pepsinized silica residue, failed to give any biuret reaction after similar incubation. The pepsin, therefore, is not destroyed by the silica residue, but is removed from solution in an active condition. After adsorption it is still available for the digestion of foodstuffs.

Müller's mussel poison was selected for experiments on the adsorption of food poisons by the silica residue. A solution of poison obtained from the liver of the Californian salt-water mussel was used. Its minimum lethal dose for intraperitoneal injection in a 20-gram white mouse was 0.04 c.cm. Of this solution 10 c.cm. was shaken with 2.5 grams (ignited weight) of silica residue for one hour, and filtered through paper. The filtrate was injected two hours later into 20-gram white mice.

0.2 c.cm.: No effect.
0.5 c.cm.: A little transient malaise after half an hour.
1.0 c.cm.: Death in twenty minutes.
0.04 c.cm. control solution caused death in three minutes.

From these figures it can be calculated that 1 gram of the silica residue removes about 100 minimum lethal doses (mouse) from an aqueous solution in one hour at the clearance point.

From these observations it must be concluded that, when magnesium trisilicate is given by mouth, the contents of the small intestine come under the influence of two potent adsorbents—namely, a proportion of unsplit magnesium trisilicate, together with hydrated silica as a freshly formed gel. Both substances remove toxic substances from solution, including well-recognized food

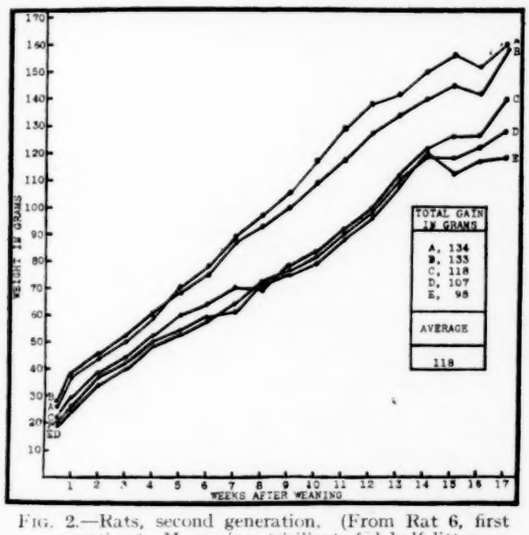

FIG. 2.—Rats, second generation. (From Rat 6, first generation.) Magnesium-trisilicate-fed half litter.

poisons. The insoluble residue is eventually voided from the colon, and can be recovered from the faeces.

Faeces were collected from two different individuals. Soluble salts were removed by lixiviation, filtration, and washing. The residue was reduced to ash, and the silica was estimated, with the results shown in Table V.

TABLE V

	Daily Dose of Trisilicate (Ignited Weight)	Diet	SiO_2 (Faecal Ash)
			per cent.
Volunteer 1...	30 grains	Mixed	2nd day ... ... 32.0 4th day ... ... 22.0 6th day ... ... 12.2 (Control ... ... 6.6)
Volunteer 2...	120 „	Milk	2nd day ... ... 17.3 4th day ... ... 29.7 6th day ... ... 31.1 (Control ... ... 0.8)

Freedom from Toxic Action

Preliminary doses were given to cats, rabbits, guinea-pigs, rats, and mice in amounts ranging from 1 to 10 grams (ignited weight) per kilo of body weight. The powder was mixed with the food and water, and the animals took it readily without suffering any apparent harm or inconvenience.

Six young adult white rats were then given daily doses of 0.6 gram of the silicate (0.45 gram ignited weight) for six months. During this time they remained in perfect health and gained weight systematically (Table VI). Rat No. 6 gave birth to a litter after a little over two months of silicate feeding. This litter of twelve was divided into two groups, one-half being kept as controls,

TABLE VI.—*Rats: First Generation*
[Daily dose of magnesium trisilicate = 0.45 gram (ignited weight)]

Rat	Original Weight	Monthly Gain in Weight						Final Weight Sept.	Total Gain
		March	April	May	June	July	Aug.		
	grams	grams	grams	grams	grams	grams	grams	grams	grams
1	101	16	13	3	6	16	20	197	96
2	98	13	23	11	17	36	24	215	117
3	100	14	17	13	18	36	22	238	138
4	106	11	16	16	20	29	21	224	118
5	78	9	8	6	5	19	17	142	64
6	104	13	41	21	23	28	19	210	106
			Litter born						

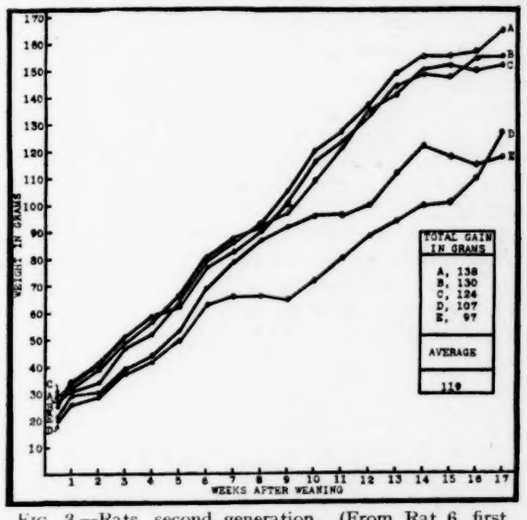

FIG. 3.—Rats, second generation. (From Rat 6, first generation.) Control half litter.

and the others being fed with silicate from the moment of weaning onwards. (Their parents had been similarly fed with silicate before conception, throughout pregnancy, and during lactation.) Each member of the second generation was given a level dose of 0.45 gram (ignited weight) daily. In the early weeks this corresponded to the enormous dose of 18 grams (ignited weight) per kilo, or about 25 grams of the parent substance—equivalent to a daily dose of between 3 and 4 lb. to an average man. Without exception they continued to grow normally (see growth charts, Figs. 2 and 3), and with every appearance

of complete health. Some months later two of this generation produced healthy litters, and the feeding experiments are being continued with the third generation. There was no disturbance of bowel action at any stage, in the direction of either constipation or diarrhoea. There was no hardening of the stools or pitting of the surface of the faeces, as noted by other observers in the case of animals fed with other bulky insoluble powders.

Three animals of the first generation were killed after seven months' feeding, during which time each had consumed an amount of trisilicate approximately equal to its own original body weight—equivalent to considerably more than a hundredweight for an average man. Two animals of the second generation were killed after four months' continuous trisilicate feeding. The intestinal tracts, their contents, and the various viscera were carefully examined, and sections were cut of the stomach, small intestine, colon, liver, pancreas, spleen, kidney, lung, thyroid, thymus, suprarenal, and heart muscle, but there was no evidence of morbid change in any part.

Many other post-mortem examinations were carried out on other species with similar results. In every case the trisilicate was found to be distributed evenly along the alimentary tract and mixed intimately with the contents. There was no evidence of sedimentation, the formation of concretions, or other localized accumulations in any area.

Other systematic feeding experiments were carried out on young adult white mice. The daily dose per animal was 0.23 gram (ignited weight), corresponding to about 10 grams per kilo, or 14 grams of the parent substance. The animals grew normally, and had every appearance of health (see Table VII), producing litters after a few months

TABLE VII.—*Mice*

[Daily dose of magnesium trisilicate = 0.3 gram (0.23 gram ignited weight)]

Mouse	Original Weight	Monthly Average of Weekly Weighings					Final Weight Sept.	Total Gain
		April	May	June	July	Aug.		
	grams	grams	grams	grams	grams	grams	grams	grams
1	22	23	24	25	25	25	27	5
2	24	24	25	25	27	30	31	7
3	23	24	25	25	25	24	25	2
4	22	21	20	21	19	21	23	1
5	26	26	28	29	30	30	30	4
6	17	19	21	21	20	21	20	3

of feeding. At the end of five months of trisilicate feeding they were all killed, and naked-eye and histological examinations were performed exactly as in the case of rats. Again it was impossible to detect any morbid change in the digestive tract or viscera.

Human Dosage

Single doses varying from 1 drachm to 1 ounce of the parent powder were given to twelve volunteers without the production of any kind of symptom. Daily doses were then given over a period of a month as follows: four received 1 drachm daily; four received 2 drachms daily; and four received 3 drachms daily in divided doses for three consecutive weeks. There was no modification of appetite, digestion, bowel action, or of the consistency of the stools. There were no objective signs of disturbance, and no malaise or other subjective symptoms of ill-health.

Summary

1. Hydrated magnesium trisilicate, as prepared for these experiments, is completely innocuous when taken by mouth even in relatively enormous doses, and does not disturb the normal action of the bowel.

2. In the stomach it exerts a prolonged neutralizing action, which continues for several hours. Its general adsorbent action is similarly continuous. Hydrated silica is produced by its interaction with the gastric juice, and is itself a powerful adsorbent for many substances, including shell-fish poison and pepsin. The pepsin so adsorbed is still available for the purposes of digestion.

3. In the small intestine the contents are subjected to the combined adsorptive action of hydrated silica and a proportion of unsplit magnesium trisilicate. The adsorptive affinities of the latter cannot be exhausted quickly, and should therefore be available throughout the whole of the intestinal tract.

4. In the faeces a rise in the percentage of silica occurs.

ALUM-PRECIPITATED TOXOID IN DIPHTHERIA IMMUNIZATION

BY

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The procedure at present recommended by most authorities for active immunization with A.P.T. against diphtheria is to give a single dose of 0.5 c.cm. or 1 c.cm. to children under 8 years (as up to that age reactions are rare), and in children over 8 years to use the Moloney test as a detector of hypersensitive individuals, giving the single dose to Moloney-negative subjects and employing T.A.F. in three doses in those individuals who are Moloney-positive.

Two-shot Immunization with A.P.T.

The published results of this one-shot method indicate that a fairly high Schick conversion rate can be obtained by the use of a single dose of 1 c.cm., but the rate obtained is not high enough to warrant the omission of a Schick test after immunization to detect those children who have failed to develop immunity. Further, the work of Volk[1] suggests that the Schick reversion rate may be too high to be ignored: in a group of 170 children who were Schick-negative four to six weeks after receiving one injection of A.P.T. on retesting after six months 9.5 per cent. were found to have reverted to the Schick-positive state. An additional disadvantage in so-called one-shot immunization is the advisability of the use of the Moloney test in children over 8 years. This in actual practice amounts to a two-shot procedure. It is suggested that these disadvantages may be eliminated and routine immunization procedure considerably simplified by using A.P.T. in two small doses. About a year ago, in a private communication, Dr. R. A. O'Brien indicated that in laboratory experiments by Mr. A. T. Glenny A.P.T. in two small doses of 0.1 c.cm., at a three-weeks interval had given a higher and more rapid immunity than a single dose of 0.1 c.cm., and suggested that in children one would expect a similar result.

In 1934 I[2] found that in children aged 8 to 14 years formol toxoid could be safely employed without the inconvenience of a preliminary Moloney test if an initial dose of 0.1 c.cm. of the toxoid were given subcutaneously, this small dose serving both as a primary antigenic stimulus and as a "detector" of hypersensitive children, the use of the formol toxoid being discontinued and toxoid-antitoxin floccules being substituted in the few cases which showed any material degree of reaction to the initial (0.1 c.cm.) dose of toxoid. Similarly, in using a small initial dose of A.P.T. one would get warning of hypersensitiveness without the risk of the marked reaction and induration which in sensitive persons results from a dose of 1 c.cm., the initial dose of 0.1 c.cm. acting as a detector dose and obviating the use of the Moloney test.

Practical Results

On Dr. O'Brien's suggestion 185 children were given by subcutaneous injection two small doses—mostly 0.1 or 0.2 c.cm. and 0.4 c.cm.—of A.P.T. at an interval of three to four weeks. Reactions to the initial dose of 0.1 or 0.2 c.cm. were infrequent, and in only one case in which a local reaction 6 cm. in diameter developed was T.A.F. substituted for A.P.T. in the second dose. In fifteen cases (approximately 1 in 12) there was noteworthy local reaction to the second dose, eight of them showing an area of redness of 5 cm. diameter. These reactions to the second dose could have been avoided by a more strict attention to the indication afforded by the first dose, but in a number of cases the parents, though specially requested to report the slightest redness following the initial dose, failed to do so, regarding the redness as a normal concomitant of the injection.

The majority of the reactors were over 8 years of age. One child reported with a very small fluctuating swelling. This was opened and a small amount of sterile " pus " removed. It is probable that dissection into the buttock would disclose in every patient in a V.D. clinic given metallic bismuth or mercury a tiny local necrosis, which is absorbed rapidly and causes no discomfort. Tens of thousands of these injections are carried out annually without any trouble to the patients. It is also probable that when A.P.T. is injected a few leucocytes locally die and are rapidly absorbed. In very rare cases—one in several thousand according to the American figures—a small local abscess occurs which disappears rapidly and causes little trouble. The boy referred to above had suffered a blow on the arm, which probably increased the local damage and caused an abscess to point: it cleared up rapidly and gave little trouble to the patient.

The ages of the children ranged from 1 to 14 years, 148 being under 10 years and thirty-seven being 10 years and over. The children under 10 years old were not Schick-tested in the first place, as during the past two years the Schick-positive rate in children of 10 years and over had been found to be 72 per cent., this indicating in the younger children a higher Schick-positive rate which did not warrant primary Schick-testing. One hundred and sixty-two of the children were Schick-tested after immunization, 149 being tested six to eight weeks after the second injection and thirteen at a longer interval. Only one of these children gave a positive result, the Schick-negative rate being 99.38 per cent. Of the children Schick-tested after immunization thirty-seven were primary Schick-positives aged 10 to 14 years, and these all showed conversion to the Schick-negative state. It was possible to test the majority of the children with fourfold Schick toxin, this test being regarded as a more stringent indicator of immunity. All the children so tested were negative, indicating a higher average content of circulating antitoxin than is revealed by the ordinary Schick reagents.

A sufficient interval of time has not yet elapsed to permit of any investigation of the Schick reversion rate of the children who have proved negative within two months of their second immunizing dose, but it seems reasonable to assume that the reversion rate will be no higher, and very possibly lower, than that found following a single dose.

Summary

One hundred and eighty-five children aged 1 to 14 years were treated with two small doses of A.P.T. at an average interval of four weeks. Moloney testing was not practised, as the small initial dose gave a safe and adequate warning of probable sharp reactors. A 99.38 per cent. Schick-negative rate was obtained in 162 children Schick-tested six or more weeks after the second dose. It is suggested that this two-shot procedure with A.P.T. is a simple and efficient method of immunization against diphtheria. Reaction difficulties are minimized without the use of the inconvenient Moloney test, and the high Schick-negative rate obtained, if consistently maintained, indicates the possible further simplification of procedure by the justifiable omission of the post-Schick test.

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IMMUNIZATION AGAINST DIPHTHERIA WITH ALUM-PRECIPITATED TOXOID (A.P.T.)

BY

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It has recently been suggested in the *British Medical Journal* (November 9th, 1935, p. 908) that the success of " one-shot " immunization against diphtheria is largely dependent on the basal immunity of a community. Where the natural Schick-negative rate is high a single injection of 0.5 c.cm. or 1 c.cm. of alum-precipitated toxoid (A.P.T.) will convert well above 90 per cent. of Schick-positive individuals to Schick-negative within a few weeks, but where the Schick-negative rate is low the conversion figure may be much lower. Unless one can control the " one-shot " method by post-inoculation Schick-testing a course of two doses—namely, 0.1 c.cm. followed by 0.5 c.cm. two to four weeks later—should be substituted, as it has been shown on animals as well as on small groups of children that two doses give better immunity.

We have recently compared the " one-shot " and two-dose methods in a residential school and in a nursery school in which the natural immunity rates were low.

Results in a Residential and a Nursery School

In the residential school, on the outskirts of London, the natural Schick-negative rate was only 20 per cent., which was unexpected, as about two-thirds of the children were from London or towns in the provinces, and must have had many opportunities of contact with the diphtheria bacillus. The ages of the children ranged from 7 to 16 years, the majority being under 12 years. Immunization was carried out with batches of A.P.T. which had proved highly effective elsewhere, but only eighty-five of 165 children (51 per cent.) were Schick-negative within five weeks of a single injection of 0.5 or 1 c.cm. of prophylactic, and only 206 of 321 children (64 per cent.) within fifteen weeks of the injection. The two-dose method (in this instance 0.1 c.cm. followed by only 0.2 c.cm. three weeks later) converted to Schick-negative thirty-one of thirty-five children (89 per cent.) within five weeks of the commencement of immunization, and all thirty-five (100 per cent.) within fifteen weeks, a much more satisfactory result. A few of the Schick-positive reactors among the older children had been Moloney-tested and thirteen had given weak positive reactions. Contrary to our ordinary practice, which is to employ T.A.F. for Moloney-positive subjects, it was decided to immunize these children also with A.P.T., 0.1 c.cm. followed by 0.2 c.cm. This procedure was justified by the results with the particular batches of prophylactic we were using, as only a few mild or moderate local reactions were encountered. As a purely precautionary measure games were discontinued for one day only for children

with any degree of soreness of the arms (about 10 per cent. of those inoculated). In one child, however, local swelling, redness, and induration persisted for several days after each injection. In no instance was there superficial small " abscess " formation, and no general reactions were reported after any of the injections.

The nursery school for children aged 2 to 5 years was in a crowded district in London. The natural Schick-negative rate was 17.5 per cent. The one-shot method (0.5 c.cm. of A.P.T.) converted to Schick-negative twenty-five of thirty-one children (81 per cent.) within eight weeks, whereas the two-dose method (0.1 followed by 0.5 c.cm. three weeks later) converted 128 of 129 children (over 99 per cent.) within the same period. All reactions occurring during immunization were negligible.

Summary

In two schools in which the natural Schick-negative rate was low two doses of alum-precipitated toxoid (A.P.T.)—0.1 c.cm. followed by 0.2 to 0.5 c.cm. three weeks later—immunized more effectively (100 per cent. Schick-negative) than a single dose of 0.5 to 1 c.cm. (64 per cent. and 81 per cent. Schick-negative).

I should like to express my gratitude to Dr. Glendining for his sympathetic help and co-operation in the whole of the work at the residential school, and to Dr. Joyce Wright for her valuable assistance in the early part of the work.

Clinical Memoranda

Perforated Gastric Ulcer in Elderly Patients

The majority of cases of perforated gastric ulcer occur in the middle years of life, in the third and fourth decades, with a sharp drop in the frequency over 50 years of age. The average age incidence is 40 years in males and 41.5 years in females. There also appears to be a seasonal occurrence during change of weather—spring and autumn months.

The following table shows at a glance the total number of cases of perforation, the number in persons over 60, and the age of the oldest patient in a series of 5,740 cases taken from the literature.

Author	Cases of Perforation	Number of Patients over 60	Age of Oldest Patient
Smith, F. K., *British Medical Journal*, 1921, ii, 1068	41	4	
Schulein, M., *Deut. Zeit. f. Chir.*, 1921, clxi, 242	21	4 over 50	2 aged 76
Speck, W., *Beitr. z. klin. Chir.*, 1923, cxxix, 537	105	8	77
Kunz, H., *Arch. f. klin. Chir.*, 1925, cxl, 419	54	3	74
Hurst, A. F., and Stewart, M.J., *Gastric and Duodenal Ulcer*, 1929, p. 286	71	8	77
Brown, H. P., *Ann. of Surg.*, 1929, lxxxix, 209	100	7	
Watson, J. H., *British Medical Journal*, 1930, ii, 169	110	Total not given	67
Read, J. C., *New York State Journ. Med.*, 1930, xxx, 591 (Gives statistics of other writers.)	66	4	76
Gilmour, J., and Saint, J. H., *Brit. Journ. Surg.*, 1932-3, xx, 78	64	5	69
Graves, A. N., *Ann. of Surg.*, 1933, xcviii, 197	4,402	(over 70) 3	77
Shawan, H. K., Ibid., 1933, xcviii, 210	227	3	70
Scotson, F. H., *British Medical Journal*, 1933, ii, 680	181	12	
Rhodes, G. K., and Collins, D. C., *California and Western Med.*, 1933	155	Total not given	72

The case recorded below is one of recovery after operation for perforated gastric ulcer at the age of 82 years.

A woman aged 82 years, a spare elderly widow, was admitted to St. Charles's Hospital on September 13th, 1935, with a history of acute severe abdominal pain followed by vomiting seven hours previously. She had complained of indigestion for the past year. On admission she was in a state of shock, lying on her back with bent knees. Her general condition was poor; she had bad teeth, a weak pulse, and her tongue was dry and furred. The abdomen showed generalized marked rigidity with tenderness over the epigastrium, and the area of liver dullness was diminished. A diagnosis of perforated gastric ulcer was made and immediate laparotomy performed. Under open ether and chloroform a right upper paramedian incision was made. On opening the peritoneum there was a gush of dark fluid. On the anterior surface of the stomach towards the pylorus there was a large oval perforation 1/4 in. in length and 1/8 in. in width in the centre of an indurated chronic ulcer. The perforation was inverted by two purse-string sutures, and a piece of omentum was sewn over it. A stab drain was inserted in the pelvis, and the wound closed in layers.

The pathological report of the fluid was as follows: " Dark brown turbid fluid with a heavy deposit of pus. Gram films show much pus and blood and a few Gram-positive cocci. A growth of *B. alkaligenes* was obtained on culture."

Convalescence was uneventful. The patient made a good post-operative recovery, and about the third day demanded more food, as she was on a modified Lenhartz diet. The drainage tube was removed on the fourth day, and she was out of bed and healed on the twelfth day. The pulse varied from 80 to 98, and the temperature never rose above 99°.

SUMMARY

A series of 5,740 cases of perforated gastric ulcer is analysed. In fifty-seven cases the patients were over 60, the oldest being 77. A case is reported of recovery in a patient aged 82 years.

London, W. DAVID H. SANDELL, F.R.C.S.

Perforated Duodenal Ulcer in an Adolescent

The following case appears to be worth placing on record in view of the patient's age.

A boy aged 16 years was admitted to hospital complaining of severe abdominal pain, which had come on suddenly ten hours before admission. The pain was very sharp and agonizing; it started in the epigastrium and then radiated to the right iliac fossa. The patient had vomited on one occasion only—some greenish watery material after the onset of the pain. The bowels were normal, and nothing abnormal was found in the genito-urinary system. On further questioning the patient admitted that for the past six months he had had epigastric pain one and a half hours after food, which gradually passed off.

On examination of the patient the temperature was found to be 100° F., the pulse 96. The face was flushed, tongue furred. The abdomen was flat and fixed, not moving on respiration; tenderness and rigidity were diffuse, being most marked on the right side, especially in the right iliac fossa. Nothing abnormal was found in the heart and lungs.

The patient was operated upon immediately. A right paramedian incision was made and free fluid was noticed on opening into the peritoneal cavity. The appendix was congested, otherwise normal. The abdominal incision was enlarged and the duodenum examined, where a perforation of the anterior surface of the first part of the duodenum surrounded by lymph exudate was found. The perforation was closed with through-and-through sutures. The abdominal wound was closed without drainage. The patient made a good recovery, convalescence being uneventful.

I am grateful to Dr. E. T. Willans, who operated on the patient, for permission to publish this case.

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Reviews

IMMUNOLOGY

It is most desirable that medical students should acquire as extensive a knowledge of immunity as is possible. It may be that the essentials of the subject could be dealt with in a book of 608 pages in a form suitable for medical students. However, Professor SHERWOOD, in his book on *Immunology*,[1] described as written for medical students, has not succeeded in doing this. The range that he has attempted to cover is very wide, including such extremes as the histology of a tubercle and the equipment of an allergy clinic (including the number of needles required). Various technical procedures are described in detail much fuller than is required to illustrate the theory ; in some cases it would be possible to carry out the reaction from the description given. Few aspects of the theoretical side are omitted, but their presentation is unconnected by any unifying systems or ideas. The following is a fair sample of the style.

"*Antigens in Hen and Duck Eggs.—Antigenic components of the egg*: Wells (1911) and Hektoen and Cole (1928) have demonstrated five antigenic components of hen's eggs corresponding to five chemically different proteins that have been isolated and studied. Wells has also called attention to the chemical and antigenic similarity between crystallized albumen of the egg from both hen and duck. Goodner (1925) found some antigenic relationship between two glucoproteins of the hen's eggs."

Nothing further is said of the significance or implication of these facts. In many instances the presentation is inadequate and inaccurate. It is recommended that when the question arises whether an abnormally high titre in a Widal reaction is due to previous antityphoid vaccination or to an actual existing infection, the patient's blood should be titrated daily after the method of Dreyer. What the method of Dreyer might be is not mentioned.

The Felton method of concentrating anti-pneumococcus sera is given as a method of increasing the protective property of the serum. It is not mentioned that the main object of Felton's concentration is the removal of substances that cause unfavourable reactions. Nor is any indication of the nature of the method given, although this is of some theoretical interest. The "zone phenomenon" is said to be best illustrated by the trypanocidal effect of immune serum injected into rats infected with trypanosomes ; the simple example—the failure of precipitate formation in the zone of antigen excess in a precipitin reaction—is not mentioned. The formation of azo-compounds is described with unnecessary fullness ; but it is nowhere clearly stated that by immunizing with a protein to which a determinant group has been coupled by an azo-link an antiserum is obtained which will react specifically with *any protein* coupled with this determinant group ; nor that the inhibition by simple haptenes is specific. Bruck's nitric acid reaction and Vernes' reaction are described between the citochol and Sachs-Georgi reactions and Eagle's flocculation test, as though they were comparable reactions. In a table illustrating the distribution of agglutinogens in human blood Groups I and IV Moss are interchanged ; on page 162 the author appears to have confused the genotypes and phenotypes of human blood groups, producing a system according to which O group cells would be agglutinated by AB sera, and by some A and B sera. A chapter on colloids is included which would justify Ehrlich's fear that the attempt to interpret immunity reactions from the standpoint of colloid chemistry would result in checking further progress. It is significant of the failure to digest the material that it is not properly arranged under headings—for example, the heading "Immunochemical Studies of the Pneumococcus," the subheading "Properties of Type III, s.s.s.," and the sub-subheadings "Structure of S.III" and "Molecular Weight of S.III" are all printed in the same type, similarly placed.

Although the book is unsuited to medical students it contains an immense amount of information. The survey of the literature is thorough and up to date. The book should be of considerable value to those who already have a broad knowledge of the subject and wish to look up details.

[1] *Immunology*. By Noble Pierce Sherwood, Ph.D., M.D. London: H. Kimpton. 1935. (Pp. 608 ; 90 figures, 8 coloured plates. 12s. net.)

DIGITALIS

Digitalis,[2] by Dr. H. WEESE, is one of a series of pharmacological monographs originated by Professor Ellinger and continued under the editorship of Professor F. Haffner and Professor W. Schulemann. Dr. Weese has worked for many years on the pharmacology of digitalis, and is therefore well fitted for the difficult task of giving a clear description of present experimental knowledge in order to provide a basis for future research and clinical practice. He gives more than 1,000 references, which occupy about forty pages in a volume of 300 pages. It is interesting to note that two-thirds of these references are to work published since 1920, though the chief facts about the pharmacology of digitalis were established before that date.

The monograph deals primarily with the chemical nature and pharmacological action of the cardiac glucosides. The author gives a clear and critical account of the mass of experimental work that has been carried out on the frog's heart and on the mammalian heart–lung preparation. The clinical use of digitalis is treated relatively briefly. The vast inflation of literature that has occurred since 1920 has rendered certain subjects—for example, the one under discussion—almost inaccessible, because the mastery of the literature alone is a task that occupies years. An authoritative monograph such as the one under review is therefore of peculiar value, because it makes it possible to ascertain in a reasonably short time the exact state of modern knowledge.

RESEARCH IN MENTAL DISEASE

Dr. EWEN CAMERON has written a book on *Objective and Experimental Psychiatry*[3] in which he stresses the need for research in mental disease. He holds the view that there is a growing distrust of purely descriptive and intuitive concepts of human behaviour, and finds it difficult to be contented with facts or assertions save where they will withstand experimentation and will not fail us on prediction. The author, indeed, gives the impression that clinical psychiatry, psychological treatment, and intuition are of but little value. The hard-working and conscientious medical officer in a mental hospital who is striving manfully to cure his patients may feel rather crushed by the author's insistence on "dispassionate instrumentation."

Dr. Cameron is, however, himself a distinguished clinical psychiatrist, and no doubt fully appreciates the fact that researches in mental disease can only be successful when the clinician and the pathologist work in close co-operation. This is a most useful book, and those who are specializing in mental disease will find within its pages an admirable summary of the researches carried out by pathologists in America and this country in recent years.

[2] *Digitalis*. By Dr. Med. H. Weese. Leipzig: G. Thieme. 1935. (Pp. 296 ; 72 figures. M. 26, Geb. M. 28.)

[3] London: Macmillan and Co., Ltd. 1935. (Pp. 271. 12s. 6d. net.)

THE NEW SOCIAL ORDER IN RUSSIA

In the preface to *Soviet Communism*[4] the authors, SIDNEY and BEATRICE WEBB, write: "Why did two aged mortals, both nearing their ninth decade, undertake a work of such magnitude? We fear our presumption must be ascribed to the recklessness of old age!" They are indeed to be congratulated on the achievement of a stupendous task. The two volumes comprise nearly 1,200 pages, and immense labour must have been expended in preliminary research and collation of material. The object of the book is to study as a whole the new social order in Russia, described as a colossal experiment in social history. This new order "claims by adjustment of a planned supply to a universally effective demand to have definitely got rid of involuntary unemployment." It must be remembered that this experiment is being applied to a population approaching 200 millions, including a hundred different nations and languages, and occupying nearly one-sixth of the terrestrial surface of the globe. The authors, though confessing to a natural bias, endeavour to present an objective view of the new social order, examining its structure and activities, its aim and purpose, its trends, methods, and philosophy.

The first volume deals with the constitution, the second with social trends in Soviet Communism; the latter heading covers much information of interest to medical readers. The chief aim of the authorities in regard to health is embodied in the slogan of the Moscow Sports Club—"We are not only rebuilding society on an economic basis: we are mending the human race on scientific principles." With this end in view especial stress is laid on improving the environment of the people and ameliorating the social conditions of each succeeding generation. In the last days of the Tsarist regime the death rate was 30 per 1,000; most of the poor lived on black bread and potatoes with occasional vegetables; milk, eggs, butter, and meat were beyond their means; 80 per cent. of the population was illiterate. Nowadays, by propaganda, by a great increase in the number of doctors, by lavish provision of clinics, hospitals, and sanatoria, the general health of the people is said to have been enormously improved. There is no free choice of doctor. A patient attends at an ambulatorium or consultation post, whence he is passed on, if necessary, to the appropriate special or general hospital. In Soviet medicine organized team work has replaced individual practice. As an example of team work the emergency system in Moscow may be cited, which deals with accidents and acute surgical cases. Day and night seven ambulances, each with a doctor (including one with a psychiatrist for urgent mental cases), and eleven others with nurses, are stationed at central points ready for immediate call. These ambulances turn out with the promptness of the London Fire Brigade, so that in every case a doctor is on the spot at the earliest possible moment.

A notable feature of Bolshevism has been the emancipation of women, who now provide two-thirds of the doctors and two-thirds of the teachers; they are to be found even in the Army and the Mercantile Marine. The much discussed system of legalized abortion was initiated at the instigation of the women. It must be remembered that in 1918 birth control was almost unknown in Russia, and abortion by unqualified persons was frequent. The latter has been practically stamped out by the present arrangement. Many applicants for the operation are dissuaded, and it is seldom performed on those with fewer than three children. Abortion is not undertaken later than the third month, and, owing to the precautions taken in the hospital and the skill of the operators, the mortality is reported to be negligible. In spite of its legalization, however, abortion is less prevalent in Soviet Russia than elsewhere. The reason given for this is that maternity is made so pleasant. The birth rate is 40 per 1,000, and there are some six million births annually. The expectant mother receives ante-natal medical care, lighter work, precedence in tram-cars and shops, and a supplementary food ration. The confinement is conducted whenever possible (in 90 per cent. of city births) in a maternity hospital, the mother obtaining twelve to sixteen weeks' leave of absence from work on full wages. On returning to her employment, which is always kept open, she receives a grant for the infant's clothing and food, while free crèches are available up to the age of 5 years. The whole cost is borne by the State.

Reference is also made to the campaign against tuberculosis and rheumatism, the workers' rest-houses and convalescent homes in the country, and the vast "medical city," to be devoted entirely to research, now in course of construction. The goal of Soviet medicine is to create the positive health of the population, and, so far as can be judged from this book, it seems to have made remarkable progress.

[4] *Soviet Communism: A New Civilization?* By Sidney and Beatrice Webb. Two volumes. London: Longmans, Green and Co. 1935. (Pp. 1,174. 35s. net.)

ELECTROTHERAPY AND THE ELEMENTS OF LIGHT THERAPY

The second edition of the excellent textbook by Dr. R. KOVACS, *Electrotherapy and the Elements of Light Therapy*,[5] is an even more formidable volume than its predecessor, and if later editions increase in weight and contents at a proportionate rate the book will attain encyclopaedic dimensions. If this occurred it would be regrettable, for the first edition owed much of its success to the impression it gave of being an authoritative presentation of the subject, based on, and within the compass of, the knowledge and personal experience of one man. Since its publication three years ago considerable progress has been made in physical medicine, notably in the development of short-wave therapy and the more extended trial of artificial fever, and Dr. Kovacs has added to the value of his book by including it in the section on recent developments in treatment. His account of short-wave therapy is clear and unprejudiced. He has maintained the high standard of the first edition, and the book should continue to be valuable to the general physician as well as to the physician specializing in electrotherapy. The author has rewritten and amplified the section on light therapy, which was rather brief in the first edition, and he has added new chapters on ophthalmology, proctology, and electro-surgery in urology.

The chapter on electric injuries in industry and in homes is again deserving of special mention. It might with advantage be reprinted as a pamphlet for those whom it concerns. The illustrations have been revised, over thirty which were out of date being discarded and more than twice that number of new ones added. Among these is a photograph (Fig. 94) of a new "grid-glow" valve, described in the chapter on apparatus as "the newly introduced vacuum tube type of wave generator . . . characterized by complete absence of mechanical moving parts. . . . Hence this new apparatus offers the combination of the principal currents . . ." etc. An attempt made in London to place an order for this apparatus was fruitless. Inquiry extending over months both in London and in New York eventually elicited the information that the grid-glow tube was not even on the

[5] *Electrotherapy and Light Therapy.* By Richard Kovacs, M.D. Second edition, thoroughly revised. London: H. Kimpton. 1935. (Pp. 696; 263 figures, 1 coloured plate. 35s. net.)

market, and that only one of its kind existed. Surely Dr. Kovacs must have foreseen that, from his account of the apparatus, readers would assume that it was available for general use and that models other than the experimental one were in existence.

Notes on Books

We welcome very cordially the second part of Professor OPPENHEIMER'S supplement to his great work on Ferments.[6] This part is devoted chiefly to the carbohyrases. A highly condensed account is given of an enormous mass of research work, and the scope of the work is indicated by the fact that thirty pages are devoted almost exclusively to a single ferment, saccharase, and that there are about 150 references to work done since 1925 on this one ferment. The part under review also deals with the oligases and some of the glucosidases. The author anticipates that the preparation of the whole supplement will occupy three years, and it is satisfactory to note that the present part has appeared at the time originally scheduled.

Two supplements to a recent issue of *Acta Paediatrica*[7] deal with special aspects of paediatrics. Dr. J. H. MAGNUSSON has written a useful monograph (in German) on the blood changes in premature infants, in which he surveys much of the recent work on the subject and adds observations on 154 babies, carried out by himself. Comparisons are made of infants treated with iron prophylactically and for curative purposes, with untreated infants. The other supplement consists of two relatively short studies of two aspects of diabetes in childhood (both in German). Dr. C. W. Herlitz contributes "Studies on the Course and Treatment of Diabetes in Children" and Dr. B. Sodering writes on "Treatment of Diabetes in Childhood without Dietetic Restrictions."

Dr. A. C. ROXBURGH'S *Common Skin Diseases*, which we noticed very favourably on its first appearance rather more than three years ago, has now reached a third edition (London, H. K. Lewis and Co., Ltd., 15s. net.). The new matter includes short paragraphs on gold dermatitis, Besnier's prurigo, recurrent cellulitis, and diet in lupus vulgaris. Some of the illustrations have been replaced, and eleven new ones are added. For the benefit of Continental readers all prescriptions are now given in percentages or metric quantities as well as in apothecaries' weights and measures.

Dr. TH. H. VAN DE VELDE'S latest publication, entitled *Ideal Birth: How to Get the Finest Children* (London, William Heinemann, 10s. 6d.), though primarily intended for prospective parents, midwives, and nurses, will also be of interest to many doctors, especially the chapter dealing with the arbitrary determination of sex. The other subjects discussed are preconceptional and conceptional hygiene, the hygiene of pregnancy, the conduct of normal birth and abnormal confinements, the care of the puerperal woman, and the attainment of complete recovery.

Although it is only two years since *A Short Encyclopaedia for Nurses*, by Miss EVELYN C. PEARCE, was first published, a second edition has been called for (Faber and Faber, 12s. 6d.). In her preface the author states that the work has been thoroughly revised and has been enlarged by some 60,000 words. It is a little disappointing to find, therefore, that advantage has not been taken of the revision to correct the slips to which we drew attention in our first notice. For the rest, however, this work is still to be highly commended; the style is clear and concise, and the general appearance of the volume, particularly the large clear type, is very pleasing.

We have received the twelfth edition, revised and amplified by Dr. A. D. Mitchell, of Francis Sutton's *Systematic Handbook of Volumetric Analysis* (London, J. and A. Churchill Ltd., 35s.), which first appeared as long ago as 1863. The eleventh edition was reviewed in our issue of July 4th, 1925. Full revision of such a book must present a formidable task, and, as the editor says, "one not to be undertaken without a feeling of diffidence." In his choice of subjects the general plan of previous editions has been followed, and in order not to increase the size of the volume unduly new subjects have only been added when their inclusion seemed essential in view of their greatly increased use. In general, the recognized standard methods are given in full detail, with briefer notes on others.

BLACKLOCK AND SOUTHWELL'S PARASITOLOGY.—We regret that in the notice of the new edition of this book published on January 18th (p. 114) the name of Professor Blacklock was misspelt and the price of the book incorrectly given. The title of the work is *A Guide to Human Parasitology for Medical Practitioners*, and the authors' names are Professor D. B. Blacklock and Dr. T. Southwell. The price is 12s. 6d.

Preparations and Appliances

A MATTRESS STRETCHER

Dr. C. J. PENNY (honorary physician and obstetric physician, Royal Hants County Hospital, Winchester) writes:

The Committee of Management of the Royal Hants County Hospital has been reconsidering the arrangements for evacuating patients in the event of a fire breaking out in the institution, and certain novel methods have been evolved. The hospital accommodates some 150 in-patients, most of whom are housed in a three-story main building, which is equipped with a central stone staircase and lift. Each wing has at its outer end an emergency iron staircase attached to an iron balcony. These two staircases are rather narrow (3 ft. 2 in. in width), somewhat steep, and have abrupt corners. There was no particular difficulty as regards walking cases and those who could safely be carried in a carrying chair, since experiment showed that such cases could easily be evacuated by the main or the emergency staircases. Recumbent patients presented the difficulty. It was estimated that there would not be many of these, but the type of emergency staircase existing precluded the use of the ordinary type of hospital stretcher. It was found that the naval type of stretcher could be used on both staircases successfully, but it took a considerable time to strap the patient securely on it, and no bedding could be taken down with it. Mr. J. A. Cooper of Winchester, with the help of the matron, Miss Parken, provided a novel solution, which was subsequently adopted. On their initiative alterations were made to a standard mattress which would enable the patient to be removed from the ward on his own mattress and covered by his own bedding. The modifications consisted of the fitting of webbing loop handles to each side of the mattress (two pairs) and to each end (two pairs); the fixing of two pairs of straps which when in use join over the bedding and patient and retain them on the mattress, and when not in emergency use lie folded along the sides of the mattress; and the insertion of large canvas pockets at the ends of the bed into which bedding and the patient's feet are inserted to prevent the patient slipping endways off the mattress. This pocket is reversible, so that it may be used whichever surface of the mattress happens to be uppermost. The advantages of this appliance are: it is quickly prepared for emergency; it is easily carried by the nurses; and it is comfortable for the patient. In practice it was found that the sides turned up, thus securing extra longitudinal rigidity and ensuring that the patient could not roll out. The patient on arrival outside the hospital was provided with bed and bedding by the same action which evacuated him. It has been decided to provide each main ward with a proportion of such mattresses, which can be prepared from ordinary mattresses at no great cost. Mr. J. A. Cooper of the Mercantile Stores, Winchester, has obtained patent rights over this service, and is able to supply.

[6] *Die Fermente und ihre Wirkungen. Supplement. Lieferung 2.* By Professor Carl Oppenheimer. Den Haag: W. Junk. 1935. (£1 8s.)

[7] *Acta Paediatrica.* Vol. xviii. Supplementums I and II. 1935. Upsala: Almqvist and Wiksells. 1935. (Each volume 20 Swedish crowns, 25s., or 5 dollars.)

THE FUTURE OF INDUSTRIAL HYGIENE AND MEDICINE*

BY

HOWARD E. COLLIER, M.B., CH.B.

The science of industrial hygiene has grown from humble beginnings. Ramazzini realized the need for its existence when he wrote in the seventeenth century that " the same means which keep up the worker's life may be the means of various grievous distempers." Since that time the conception of the function of such a science has broadened, until now it aims at securing conditions which will enable workers (even in hazardous occupations) to continue their work and yet maintain full health of body and of mind. Industrial hygiene and industrial medicine may be defined as being the study and application of the principles and practice of modern hygiene and medicine to the special problems of health and disease as they are met with in industry. Industrial hygiene is therefore an applied science. It is a practical science, concerned with the actual problems which confront living persons as they carry out their work in industry.

The field of study covered by the term " industrial hygiene " may be divided into three groups of subjects: (1) the establishment of health in industry—industrial hygiene ; (2) the prevention of disease and accident ; (3) the repair, healing, or cure of accident and diseases in industry. These last two groups together make up what may be called " industrial medicine." The following table provides a working summary of the field of work of industrial hygiene and medicine.

TABLE I

Hygiene	Surgery	Medicine
1. Industrial health : (*a*) Industrial environment : Light, air, heating, etc., ventilation Dust and dirt control and prevention Nutrition Physical culture (*b*) Personal factors : Personal hygiene	2. Accident and injury : Minor surgery Accident prevention and treatment Ambulance work Rescue work Fractures and re-education " Compen-sation " Alternative and light employment	3. Diseases of occupation : (*a*) Special toxins—for example, lead, manganese, arsenic, silica, benzol, etc. (*b*) Special disease risks in certain industries—for example, rheumatic disorders, pneumonia, bronchitis, etc.

4. The psychology of industry :
   (*a*) Personal (fitness for work, aptness to work, etc.).
   (*b*) Social (human relationships, etc.).
5. The medico-legal aspects of industry.
6. Research and investigation.
7. An accurate knowledge of industrial processes and of the special hazards and accident risks of each process.

How widely different this conception of industrial hygiene is from the conception which Ramazzini held as he wrote his *Diseases of Tradesmen* is evident enough. He wrote of " diseases of tradesmen " ; we study the " health " of workers. Between these two conceptions there lies a history of a progressive development in medical thought which is of some importance.

Development of Medical Thought

We, who are the practitioners of to-day, were educated in an age that was still " disease-minded." The medical man was the " curer " of disease. Until disease manifested itself our patients did not think of consulting us. Next came the time when we began to think about " preventing disease." This was a real step in the emancipation of our profession from the " disease obsession " of the Victorian Age. This obsession was, in part at least, the product of the appalling health conditions which followed the sudden rise of the industrial era in England.

Now at last we begin to emerge into the third era. We begin to be " health-minded." In the true Hippocratic sense, we cease to think in terms of disease, we begin to think in terms of health. We regard disease, wherever it may appear, as a sign of failure of our communal medical service. We are no longer complacent about the fact of disease.

It is into such an atmosphere of change that the department of industrial hygiene and medicine of this university has been born. It has been started primarily to meet certain definite and practical needs which arise from the present industrial situation. Let us consider these needs.

The Responsibilities and Demands of Industry

The old self-contained village community is gone. Even the family business appears to be in danger of gradual extinction. The extreme individualism of the Victorian Age is almost a thing of the past. No longer can it be justly said of industrialists, as it was said of the industrialists of his own day by Robert Owen: " We industrialists are constantly taking pains to perfect our dead machinery, but of the living we take no heed."

Under the urge of subtle social and cultural changes industry has been led to assume burdens and to discharge responsibilities which formerly were evaded. To-day Acts and Regulations, " Compensation " and " Insurance," have convinced industry of the necessity (as well as the advantage) of creating and maintaining health in the industrial organism. In order that it may be able to carry these new burdens, industry must seek the aid of those who are best qualified by experience and by knowledge to help it to do so. Industry begins to be aware that it needs the help of our professional skill. Furthermore, the good health of the worker is an economic asset. It is also one of the final justifications to the community for the existence of any given industry.

Industry is already demanding, and will do so increasingly, that the medical profession should be prepared: (*a*) to advise upon all matters which affect the health of those who are engaged in industry ; and (*b*) to forecast the health effects of any proposed new processes or new substances which are likely to become industrially important. These demands must determine the future development of industrial medicine ; they will indicate also its field of investigation and research. And it must be noted that these demands do not come from one section or class in industry ; they come from all sides. They come with great force and persistence from the industrial worker whose health is his fortune (witness, for example, the recent debate in the Trades Union Congress) ; they come with equal force from the industrial manager. It is important that we should distinguish clearly between the demands of the worker and those of the manager. A service which is adequate to meet the needs of the manager may fail entirely to meet those of the worker.

It will never be sufficient merely to create within our profession a new specialism called " industrial hygiene and medicine," and to make it a section or part of the science of industrial management. That will never meet the full needs of our time. What is equally necessary (if not more so) is that within the profession as a whole (and especially in the ranks of the general practitioner, the bulk of whose patients are perforce industrial workers) we should create a large body of informed knowledge concerning the problems of the industrial worker. The general practitioner of the future must have this special knowledge if he is to fulfil adequately his role as health adviser to the industrial worker.

Existing Health Organizations

The conception of health as a " realizable state " and as the aim or purpose of medical science is not, however, the exclusive property of the medical profession. It dominates the thought of the modern age. We are being driven, therefore, by an external force and by an internal force towards a single end. That end is health in industry. The internal force has arisen out of the natural evolution of medical science as it has steadily opened up new and wider fields of service for us. The external force, on the

* An abstract of a lecture delivered at the University of Birmingham.

other hand, operating in the world around us, confronts us with a demand for a sound communal health service. Of this communal health service an industrial health service must be an integral part. I should be the last to suggest that nothing effectual has been done during the last fifty years towards the provision of an industrial health service. A glance at the following list of persons and of organizations that have been and are at work within this field will show how much has been done.

TABLE II

A. *Reparative and Hygiene Services:*

1. The medical department and inspectorate of the Home Office.
2. A few whole-time industrial hygienists and a much larger number of part-time workers.
3. Industrial nursing service.
4. Industrial welfare and accident services.
5. The certifying factory surgeon service (largely judicial-administrative).
6. The general practitioner service and the national health insurance schemes.
7. The public health services.
8. The hospitals (special, general, and public).

B. *Industrial Research and Educational Services:*

1. Research and teaching schools, like the London School of Hygiene, and universities (public health departments).
2. Medical Research Council, the universities' medical faculties, and some special departments of research like the National Institute of Industrial Psychology.
3. Certain special trade research boards and workers and other educational bodies—for example, works laboratories, chemical industrial research, potteries research, T.U.C., School of Mines, Industrial Welfare Society, Workers' Educational Association, and so on.

C. *Judicial and Governmental Functions of the Home Office:*

Home Office Medical Service.
Silicosis Board.
Certifying factory surgeons.
Workmen's compensation, referees.
The lay courts and Government Departments; Ministry of Health, and so on.

It would appear reasonable to suggest, however, that co-ordination, extension, and simplification of these services are urgently needed. At present we are in a stage of transition. At the moment our service is fluid; it can be moulded, modified, extended, and completed. The future of industrial medicine depends on our ability to foresee what modifications and what extensions are necessary, in order that the real needs of industry may be met by the new industrial health service which we aim at developing.

Health Needs of Modern Industry

The need of the industrial worker is that he may keep well and have employment. To this end he must have: (1) a healthy intra-industrial environment, and (2) a healthy extra-industrial environment. The contribution of modern medicine to the industrial worker is to aid in the achievement of these conditions. The final responsibility for intra-industrial environment rests directly upon the employer, indirectly upon the community. The responsibility for the extra-industrial environment rests in part upon the individual worker and in part upon the community. Now the function of the profession is to advise the community, the employer, and the worker how the factory and the home environments may be kept healthy. The community requires guidance so that satisfactory legal enactments may be passed which will neither hamper sound industrial development nor hinder the worker from obtaining employment, and yet will offer a reasonable guarantee that satisfactory intra-industrial and extra-industrial environmental conditions are maintained. (By "environment" is meant both the physical and the psychological surroundings of the worker.)

The actual "medical" needs of the industrial employer may be summarized thus:

1. Intra-factory "hygiene" (medical, surgical, psychological, medico-legal, etc.).

Industrial physician and university departments:

2. Knowledge of "special risks"; knowledge of any dangers inherent in new processes or new materials.
3. Research or investigation into 1 and 2.

In this aspect of industrial medicine the intern industrial physician finds his special field of service. Under the Workmen's Compensation Acts the employer is made "responsible for safety." As the law stands at present the employer's legal responsibility is restricted (in theory) to a responsibility for the results of accidents and for those special occupational diseases which are scheduled under Section 43 of the Act. But the modern employer does not consider that his legal obligations are his only obligations to the workers. Year by year, as the scope of the meaning of the word "accident" has widened, and as both the economic value of a healthy personnel and the moral right of the worker to a healthy factory environment have been realized, employers are shouldering the full responsibility for the whole of their intra-industrial hygiene. I have dealt elsewhere with the varying kinds of medical, nursing, and other services which together make up a complete health service for industry.[1]

The industrial medical needs of the worker are as follows:

1. Intra-factory hygiene.
2. Extra-factory hygiene at home.
3. Personal hygiene and personal advice concerning 1 and 2; medico-legal, etc.

Here we enter upon the special field of the industrial general practitioner. If he is adequately to discharge his function in an industrial health service he must have behind him the facilities for investigation and consultation which can be provided only by a well-planned department of industrial hygiene and medicine in a modern university.

Functions of an Industrial Medical Service

In brief, then, we may say that an adequate industrial medical service must be planned so that it may perform the following functions in industry:

1. Advise the community in matters of industrial health. This function is the special province of the Home Office medical service and of the public health services. The work involves much specialized investigation and research. (It is to be noted also that the special work of the certifying factory surgeon and of medical referees should form an integral part of the "judicial" aspect of the health service.)

2. Advise the employer so that he may be able to discharge his "responsibility for safety" within the four walls of the factory. This can only be done by a properly organized medical service in industry. The complexity of such a service will vary according to the particular needs of each factory, large or small. This work is the special field of the whole-time or part-time "industrial physicians."

3. Enable the worker to obtain the expert advice he requires. For this are needed: (*a*) a very large body of industrial general practitioners especially skilled in the particular problems and risks of each trade and process; and (*b*) a special group of industrial consultant physicians.

4. Conduct investigation and research throughout the whole service, with a university department to co-ordinate and to complete the work done in various branches of the service. The university department also should be prepared to undertake any special investigation into the probable health effects of new industrial processes or of new substances introduced into industry.

The University's Special Contribution

In an ever-changing industrial world industrial health cannot be maintained—even if it were once achieved—without constant and properly co-ordinated research. It is here that the university enters its special field of service to industry. The function of investigation into health and disease in industry ought to spread through all of the three or four branches of this industrial health service. There is an idea abroad that research must be confined to universities. This is a serious heresy. What

is really needed is that research and investigation should be spread throughout all parts of the service, and brought to a central point in the universities, where research into fundamental problems can be carried out in fully equipped laboratories.

In addition to research and investigation, universities are charged with the responsibilities of teaching. These responsibilities will be met by: (1) The establishment of advanced courses of study for industrial physicians. These courses must ultimately aim at "M.D." and "diploma" standards. (2) Post-graduate courses for industrial general practitioners. These courses should be designed (so far as possible) to meet the practical needs of the individual industrial practitioner. These needs vary according to the occupations of the workers for whom the industrial practitioner is responsible. (3) Post-registration course for industrial nurses; and possibly (4) special "sanitary courses" adapted to the needs of industrial welfare workers. Lastly, the university department must create a "bureau of industrial health information" and be prepared to undertake a considerable amount of general education in industrial health.

It would appear, therefore, that in the future development of a sound industrial health service we must aim at training: (*a*) industrial physicians and factory surgeons for the community service and for the intern factory service; (*b*) industrial general practitioners for the care of the worker; and at creating adequately staffed and equipped university departments of industrial hygiene and medicine.

The Health Service's Contribution to Worker and Employer

Still adhering to broad general principles we may now ask what is the nature of the practical contribution which such a service will be able to make to the worker, the manager, and to medicine? So far as the industrial worker is concerned it will:

1. Assist in the choice of a suitable career (physical and psychological selection).
2. Safeguard the worker against "health hazards."
3. Provide early and accurate diagnosis of industrial maladies.
4. Provide correct and early treatment of industrial illness and accident.
5. Provide accurate medico-legal advice and assessment.
6. Provide research and investigation.

The contribution of such a health service to the employer or industrial manager will include:

1. Accident prevention and early recovery (rehabilitation).
2. Prevention of special occupational diseases and control of epidemic and general disease.
3. Advice and criticism on design and reconditioning of factories; also on heating, ventilation, lighting, etc.
4. Forecast of the probable health effects of: (*a*) new substances or new methods; and (*b*) hours of work, rest pauses, nightwork, etc.
5. Selection of personnel for all kinds of work; the re-examination at suitable intervals of workers, especially those exposed to "risks"; and the examination on return from work or accident.
6. The understanding and handling of personal and social relations within the industrial organism.
7. Statistical investigation in the control of illness, "lost time," labour turn-over, accident, etc.
8. Health education—body and mind.
9. Medical research.
10. Medico-legal problems, assessments, etc.
11. The organization and training of adequate ambulance, first-aid, and surgery services, rest and recovery rooms, etc.

To the community the service would contribute suggestions for soundly conceived and impartially administered industrial laws of a preventive kind, and a reasonable assurance that, so far as human knowledge and foresight can achieve it, the intra-industrial environment of the working population shall be favourable to health and not inimical to it.

Its Contribution to Medicine

Nothing has been said hitherto of the contribution which a sound industrial health service can make to medicine. In industrial medicine there lies a vast potential field of service. We are told that the profession is overcrowded. No doubt this is true of ordinary "reparative" medicine, but the field of industrial hygiene is almost unexplored. Moreover, its gradual exploration can add great interest to the routine "grind" of general medicine. With a wider knowledge there always comes an ability to serve patients better. I have not referred to the "economic prospects" of this new form of medical practice, but it may be said that, at the worst, they are not inferior to those of other branches of our profession.

I may be permitted to refer, in conclusion, to certain special contributions which an efficient university department of industrial hygiene and medicine can make to the medical profession. Apart altogether from teaching and research, such a department should be able to accumulate intimate and detailed up-to-date knowledge concerning the medical problems of industry. This information should be available to all who need it. But especially it should seek to acquire practical knowledge of the nature of the special risks or dangers to which workers are exposed in industry, which should prove useful to general practitioners and hospital consultants alike. It cannot be too strongly emphasized that the diagnosis of industrial maladies largely depends upon an accurate knowledge of industrial processes, and of the varied toxins to which modern industry exposes its workers. Occupational poisons are seldom simple. For example, exposure to lead may involve exposure also to antimony, to organic solvents, or to arsenic. It is of the first importance that every practitioner should be able to learn what are the probable kinds of poisoning to which any particular worker may be exposed.

In the treatment of industrial accidents and in the assessment of incapacity after accident the same considerations hold. Unless the surgeon actually knows the amount of strain involved in any particular kind of occupation, how can he hope accurately to estimate degrees of disability or fitness for work? Perhaps enough has been said to suggest the nature and contributions which industrial hygiene and medicine can make to industry, to medicine, and to the community. What of its future? In a word, the future of industrial medicine and hygiene is bound up with the development of a sound industrial medical service.

REFERENCE

[1] Collier: *Industrial Welfare and Personnel Management*, July, 1935.

A. Touraine and J. Roitenstern (*Le Nourrisson*, November, 1935, p. 363) have studied the records of the out-patient clinic at the Tenon Hospital over a period of twelve years with the object of discovering the effects on the offspring of treating syphilis in pregnant women. They found that non-syphilitic women gave birth to 75 per cent. of surviving children from their pregnancies during the period, while untreated syphilitic women produced only 25 per cent. In the case of women treated with mercury or potassium iodide by the mouth, the infant survival rate was 13.8 per cent. before treatment and approximately 65 per cent. after treatment. Patients injected with mercury, arsenic, or bismuth gave birth to 68.6 per cent. of surviving children. The authors maintain, therefore, that the chances of survival of the child are not much improved by injection treatment as compared with oral therapy. They record further statistics which indicate the immense value of treatment during pregnancy. Whether treated by the mouth or by injections, the mortality rate of the offspring (including miscarriages) falls by 50 or more per cent. They recommend that treatment should be given during the pregnancy, and consider that it does not much matter what form of treatment is employed.

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THE SURGERY OF PROSTATIC OBSTRUCTION

If we turn back and look for a moment at the history of prostatic surgery we find that progress in this field has not been gradual and continuous, but has been more or less discontinuous—periods of intense activity alternating with others of comparative stagnation. As we are now in the midst of an active period, and three papers on prostatic surgery are appearing in this week's issue, it may be opportune to consider the progress that has been made, in the hope that a brief general survey may prove of assistance in developing further technical improvements. No one will admit that finality has been reached.

In 1887 McGill of Leeds and Belfield of Chicago published accounts of operations designed to relieve prostatic obstruction. Both operators opened the bladder and removed the whole or a part of the intravesical projection of the gland. Belfield soon abandoned the operation because the results were so uncertain, but McGill seems to have extended it, and in some of his later cases appears to have removed the greater part of the gland. Unfortunately he died in 1890 at the early age of 40, and it is to be regretted that none of his colleagues carried on his pioneer work.

In 1893 White of Philadelphia read a paper on the surgery of the hypertrophied prostate, at the end of which he suggested that castration might cause the prostate to shrink and thus relieve the obstructive symptoms, but added that he had never had the courage to recommend this procedure to his patients. The idea was, however, widely taken up, and a large number of castrations were performed both in America and in Europe. The results were, however, most disappointing. There was little or no improvement in the severity of the urinary obstruction, the mortality was much higher than had been expected, and the operation was not infrequently followed by severe mental symptoms. Castration was soon abandoned, and its place was taken by vasotomy. This operation also proved to be a failure. Although the mortality was diminished, there was no improvement in the patient's urinary condition. The net result of White's suggestion was to turn the attention of surgeons from a direct attack on the problem of prostatic obstruction to indirect methods of dealing with the condition, and no real advance in prostatic surgery took place for nearly ten years. This was the first period of stagnation.

The opening years of the present century marked a period of great activity in the surgical treatment of prostatic obstruction, and the enlarged gland was attacked both from its perineal and from its vesical aspects. Taking the perineal operation first, Zuckerkandl in 1889 described the curved prerectal incision, and was, so far as one can ascertain, the first to remove a non-malignant prostate by this route. Six years later Nicoll overcame the difficulty of the operation, due to the depth of the gland, by opening the bladder and having an assistant to push the prostate downwards while he dissected it out of its sheath from the perineum. The suprapubic incision advocated by Nicoll was abandoned by Albarran, who, following the anatomical researches of Proust, made the operation popular in France. Three names will always be remembered in connexion with perineal prostatectomy. They are Zuckerkandl, Albarran, and Young. It is difficult to apportion the credit, but one may say that Zuckerkandl initiated the operation, Albarran perfected it, and Young popularized it. This operation has remained practically unchanged since the early years of this century. The only modification of importance since then was due to Wildbolz, who sutured the neck of the bladder to the stump of the urethra, thus obliterating in great measure the cavity left after enucleation of the gland.

The suprapubic operation was advocated in 1895 by Fuller. He removed as much as possible of the prostate from above, aided by pressure of his fist in the perineum, and then drained the bladder from below. He recognized the importance of removing the whole of the gland, but his operation appears to be comparable to some of McGill's later operations. In 1901 Freyer described his method, by which he claimed that "the whole prostate within its capsule had been removed." There can be no doubt about the results he obtained, but the question was at once raised as to whether his claim of total prostatectomy was justified. A vigorous and somewhat acrimonious discussion followed the publication of his paper. Some questioned his claim to priority, while others doubted the accuracy of his anatomical descriptions. Freyer is now given just credit for a very notable advance in prostatic surgery, but most authorities agree that the whole of the gland is not removed by his method. The "hypertrophy" of the prostate—whatever its real nature may be—takes place in the portion of the gland situated above the ejaculatory ducts, while the portion below this level remains unaffected. Freyer only removed the "hypertrophied" part, leaving behind the ducts and the unaltered portion below them. On the other hand the whole of the prostate above this level can be removed, and it was his aim always to do so. The so-called "adenomatous portion of the gland" lies embedded in a thinned-out layer of compressed prostatic tissue, which is surrounded by the fibrous sheath of the gland. There are two planes of cleavage: one between the "adenomatous" portion and the thin layer of prostatic tissue, and the other between the prostate and its sheath. Freyer always aimed at carrying out the enucleation in the outer of these two planes, and thus removed the whole of the

prostatic tissue down to the level of the ejaculatory ducts. Other observers took the inner plane of cleavage, and claimed that the cavity thus left was lined by prostatic tissue. They were perfectly correct in this statement, but they overlooked the fact that this was not what Freyer meant by the operation he described.

During the ten to fifteen years following the publication of Freyer's first paper on the subject his technique was followed without alteration. The only modification that was made was the introduction of the " two-stage " operation. However, during this period intensive researches were carried out on the problem of the estimation of the renal efficiency. Yet, so far as advances in prostatic surgery are concerned, it may be termed the second period of stagnation. In 1920 Thomson-Walker described his open method of prostatectomy. This was a great advance on Freyer's operation, because there was efficient haemostasis and the greater part of the procedure was carried out under visual control. Most surgeons were contented with this operation, and until recently it was undertaken without modification. This forms the third period of stagnation. In 1929 S. H. Harris described his method, which has two distinct aims. The first is to obliterate as far as possible the cavity left after enucleation, and the second is to provide such exact haemostasis that the bladder could be closed completely. Harris's method is the most important recent advance in this branch of surgery, and it seems probable that his technique will supplant all others in suitable cases. It is hardly safe to attempt his operation in the presence of pronounced sepsis, and therefore, so long as patients are encountered with badly infected bladders, the surgeon will not be able to dispense entirely with the older methods.

THE GRADING OF MILK

We publish elsewhere in this issue (p. 227) a summary of a report by Professor G. Selby Wilson and others which embodies the findings of several years' work on the bacteriological testing of milk. This report is concerned only with methods of ascertaining the degree of contamination of milk with bacteria in general—that is, its " cleanliness "—and not with its " safety " in the sense of its freedom from bacteria capable of causing disease. It thus deals with only one aspect of the milk problem, and to those unfamiliar with this problem a glance through the report will make this aspect of it appear exceedingly complex. Actually the ultimate effect of a very large amount of the work described is to justify a much simpler method of estimating the bacterial content of milk than that at present in use. Up and down the country at the present time numerous skilled technicians in public health laboratories and on the staffs of the larger dairies are daily engaged in carrying out a method of bacteriological test which this report condemns. Having pushed this method (the plate count) off its pedestal the report proposes to substitute a much simpler proceeding, the methylene-blue reduction test, and to apply it to all milk sold for liquid consumption, a vastly different and more sweeping proposal than any hitherto put forward to ensure a satisfactory supply. That time is being wasted on unnecessarily elaborate tests with a misleading pretence to accuracy, carried out on only a trivial fraction of the total milk supply of the country, will probably be news to most people. The proposals contained in this report have no declared official backing. At many points they are only tentative, since methods of test must depend on the standards or grades set up, a matter ultimately for the Ministry of Health, whose order of 1923 defining five grades of milk, and the methods by which their qualifications are to be tested, is still in force to-day. It is clear that these will have to be reconsidered.

It will be of interest to see how far the recommendations in this report prove acceptable to the Ministry of Health, the public health authorities, the Ministry of Agriculture, and the dairying trade. Any redefinition of grades will have to take into account qualities other than general bacterial cleanliness, and it may indeed be asked whether this property is as important as so monumental a study as this would seem to indicate. There is a good deal to suggest that in some ways reasonably dirty milk can be safer than clean, in that extraneous non-pathogenic bacteria are enabled to multiply in it at the expense of pathogens. What matters in milk, apart from its keeping quality, the chief property affected by its degree of bacterial cleanliness, is that it shall not contain any of a number of pathogenic bacteria in the living state, which may be derived either from the cow or from human sources in handling. Admittedly any measures encouraging cleanliness will reduce the likelihood of dangerous contamination from any source other than the cow itself. But one of the principal difficulties remains—the possible existence of tubercle bacilli in the milk itself. There is much confusion of thought on this subject, and anything but general agreement on the measures desirable to meet this danger. Whatever new administrative measures are decided upon, it is to be hoped that the property of cleanliness will once and for all be disentangled from the property of being tubercle-free, both in designation and in the minds of the medical profession and of the public. The two properties are wholly distinct in origin and effect, and, short of pasteurization, are secured by different measures. Whatever grades may be set up in the future, it is hoped that there will be nothing corresponding to the present " Grade A," which has misled the whole of the public and most of the profession for the past thirteen years. The term naturally suggests perfection, it comes readily to the lips of anyone wishing to prescribe a safe milk ; yet there is no mention of tubercle bacilli in its definition, and it does, in fact, more frequently contain them than any other graded milk. This blunder of 1923 alone demands

that some change be made, and in the light of such work as that under review there is a case for scrapping the whole existing system with much of the laboratory effort by which it is sustained, and for substituting new categories and methods.

SOME MEDICAL PROBLEMS OF AUSTRALIA

We publish this week as a Special Supplement three papers read in opening discussions at the Annual Meeting of the British Medical Association in Melbourne last September. The common heading "Some Medical Problems of Australia" is not meant to imply any connecting thread between the papers; they are merely brought together for convenience of publication. Sir Raphael Cilento discusses with sombre eloquence one of the population problems of Australia—that of racial pressure in the Pacific. His conclusion is that health and the dominant mentality that goes with abounding health are both essential to ensure survival of the Australian people in the period of increasing pressure in the Pacific that appears to him imminent and inevitable. Dr. Allan Vickers, chief medical officer of the Australian Aerial Medical Services, describes the method by which was attacked the problem of supplying improved medical facilities for the scattered dwellers in an area larger than Western Europe. He outlines the origin of the "flying doctor" service with which the name of the Rev. John Flynn is indelibly linked. Within less than ten years the flying and wireless equipments have been so much improved and extended that already the Aerial Medical Service is no longer, in the eyes of the people whom it serves, an experiment, but "a proven safeguard to be relied upon in their hour of need." Dr. T. J. Cotter records in some detail and discusses the series of outbreaks of Weil's disease, of which the earliest was recognized in North Queensland in October, 1933. This is the first known occurrence of leptospirosis in Australia. Dr. Cotter regards the occurrence of Weil's disease in the sugar-cane area of North Queensland as of serious import from the point of view both of health and of economics. The climatic conditions and the presence of infected rodents will almost certainly cause the disease to become endemic. Its control therefore becomes a medical problem for Australia.

A MEDICAL SCHOOL IN FIJI

One of the most difficult and yet one of the most important parts of the White Man's Burden is the medical care of the backward races, towards whom he has assumed a position of trusteeship. The difference between modern European medicine and surgery and the superstitious mysticism of the witch doctor among uncivilized peoples is so great that there may be a temptation to impatience. To sweep away the medicine man with his charms and incantations, to say nothing of his grossly harmful practices, and to replace him by an adequately trained European practitioner is an attractive short cut, certainly. *Magna est veritas, et praevalebit,* as everyone knows: but there are ways and means of assisting her to prevail, and the establishment of schools where the native-born can assimilate European medical ideals and then go forth to practise them for the benefit of their own people is in the long run often the shortest way home. In many tropical dependencies this principle has been adopted, with a success which has varied in different places, but everywhere with high hopes of the future. One of the most interesting experiments of this type is the Suva Native Medical School in Fiji, which was founded many years ago, and has received eulogy recently from Sir James Barrett, President of the British Medical Association, who visited it last year. In the *Medical Journal of Australia* (November 30th, 1935, p. 757) Sir James has given particulars of the system upon which this school is administered. The entrance examination for the four years' curriculum includes a thorough knowledge of written and spoken English. Thirty-seven students are now undergoing training at the school; eighty-four graduates are in practice in the Western Pacific Islands, a majority of them in Fiji itself—Samoa and the Gilbert and Ellice Islands absorb most of the others. The Suva Memorial Hospital is staffed by forty nurses, half of them Fijians, the other half Europeans. Forty-seven obstetric nurses are practising in Fiji, and many other nurses are working in other Pacific Islands. Welfare centres and the like are in existence, staffed by trainees of the Suva school. Sir James Barrett pays a handsome tribute to the European medical officers who manage this interesting school, and speaks very highly of the intelligence of its graduates and undergraduates. The Polynesian races comprise many peoples of attractive characteristics and high capacity for assimilating civilization. There can be little doubt that the policy of training Fijians and other islanders to look after the medical needs of their own people is the best way of introducing the benefits of Western science to the Pacific, for it will not arouse so much antagonism as might be aroused if Europeans were alone entrusted with the medical care of the Polynesian.

"MINIATURE RHEUMATIC FEVER"

In a recent study in the *Archives of Disease in Childhood*[1] of the sedimentation rate in juvenile rheumatism Drs. W. W. Payne and B. E. Schlesinger confirm their own and other previous work on the close agreement between the degree of rheumatic activity and the sedimentation rate. They also give more detailed observations on certain aspects of the problem, one of the most important of which is the relapse after a throat infection. It is well recognized that after tonsillitis a rheumatic child will not infrequently relapse after ten to fourteen days. Payne and Schlesinger have observed every degree of relapse, varying from an acute and virulent pericarditis with early death to the mildest forms of rheumatic fever. The latter they have termed "miniature rheumatic fever." It is characterized by slight degrees of fever, transient tachycardia, and a persistent or fresh rise in the sedimentation rate following the subsidence of the throat infection. In the mildest cases there are no changes in the temperature or pulse rate but only in the sedimentation rate—otherwise they would pass unnoticed. These cases are of some interest in showing that a latent tendency to relapse after tonsillitis is frequently present, although in most instances the patient's defences are fortunately

[1] December, 1935, x, 403.

able to overcome this. This raises two points of practical importance. On the one hand it means that, although the present search for the "cause" of juvenile rheumatism is of great interest, methods of increasing the strength of the defence mechanism are of equal if not greater value. In this connexion the use of aspirin during the latent period after tonsillitis in a rheumatic child is held to reduce the risk of a relapse, and it would be instructive to know whether this therapeutic effect is in any way associated with changes in the sedimentation rate. The second point of interest lies in the indications given by the sedimentation rate for the necessity of precautionary measures when a rheumatic child has an infection of the upper respiratory tract. Obvious cardiac complications will mean a strict regime for the patient, and "miniature rheumatic fever" will need careful observation for some weeks. In the absence of any clinical signs of fresh cardiac involvement a normal sedimentation rate would appear to be a reliable indication that special precautions are unnecessary.

EPITUBERCULOSIS

The term "epituberculosis" was first used in a paper by Eliasberg and Neuland in 1920, and since then no satisfactory pathological and experimental evidence has been adduced to clear up the confusion that exists on this subject. Grancher's conception of "splenopneumonie" as a special type of tuberculous reaction in the lung has been ignored by most writers. Some of the most important contributions to the solution of the problem have been made by Grancher's distinguished pupil Armand-Delille. A recent paper by E. H. Oppenheimer,[1] impressive as it is, suffers from the common defect of ignoring the French workers, and the author's conclusions would be strengthened if he could reconcile them with those of the Paris school. Put briefly, epituberculosis is in the main a clinico-radiological conception: there is a benign, febrile, pneumonia-like reaction in the lung, and *x*-ray examination reveals a slowly resolving shadow. It is always difficult and often impossible in the early stages to differentiate by *x*-ray examination between the benign condition and tuberculous pneumonia of a fatal type. The main theories to account for the *x*-ray and other findings in epituberculosis are that: (1) they may be caused by collapse from pressure of enlarged tuberculous mediastinal glands; (2) they may result from a chronic non-tuberculous pneumonia in a lung made more susceptible by the presence of a tuberculosis infection; (3) epituberculosis may be a non-inflammatory reaction (oedema or increase of connective tissue); and (4) epituberculosis may be a retrogressive tuberculous pneumonia. Oppenheimer, on the basis of suggestions made by Arnold Rich that there were similarities between epituberculosis and caseous pneumonia, carried out a series of experiments on rabbits, using animals which were hypersensitive to tuberculin as well as non-allergic controls. He found that an *x*-ray lesion quite like that of the so-called epituberculosis followed the experimental introduction of dead tubercle bacilli into the bronchus of hypersensitive rabbits. The clinical course was similar to that of human epituberculosis. In non-allergic animals similar changes could not be obtained, and in immunized hypersensitive animals injected intratracheally with living tubercle bacilli a similar *x*-ray shadow was observed, which, however, spread progressively, and the animals died. From anatomical studies of the experimentally produced epituberculosis it appears that the lesion is essentially a tuberculous pneumonia, clearing by resolution and organization. From these experimental findings and other considerations Oppenheimer puts forward a working theory for the occurrence of epituberculosis in human subjects. He suggests that it is the result of erosion of a bronchus by a caseous lymphatic gland containing relatively few viable bacilli. The characteristic *x*-ray shadow is caused by a lesion which is essentially a tuberculous pneumonia, brought about by the discharge of caseous material impregnated with tuberculo-protein and dead bacilli (although containing some living bacilli) into the lung of a patient already sensitized and immunized by the previous infection. If a similar accident happens with a gland teeming with living bacilli a similar *x*-ray shadow will be observed at first, but the process will extend progressively. Between these two extremes are the various and clinically familiar shades which are neither so benign as the epituberculous lesion nor so acute as the fatal caseous pneumonia, the outcome depending upon the balance between the number of living bacilli in the lymphatic gland and the degree of acquired resistance and hypersensitiveness of the body. If this view is accepted the term "epituberculosis" might well be dropped. The lesion it represents would then be recognized as the most benign and retrogressive type of tuberculous pneumonia.

[1] *Bull. Johns Hopkins Hosp.*, 1935, lvii, 247.

NOISELESS HOSPITALS

Many city hospitals are in noisy situations, and nothing in particular can be done about it, but a great deal can be done to minimize the internal noise for which hospitals are notorious. We know of one large hospital near London where the door of the board room appears to be so constructed that no one, however careful he may be, can shut or open it without sending a reverberation along the corridors, as if the whole place were panelled with bright mirrors of sound. On the other hand, at Nuffield House, the private ward block recently opened at Guy's, all the doors are fitted with a braking mechanism, so that even if an exasperated person tried to slam them they would close without noise. It will be remembered that at the Anti-Noise League's exhibition at South Kensington last summer a special exhibit was shown for dealing with hospital noises by the treatment of walls and passages. The League (66, Victoria Street, S.W.1) has now published a four-page leaflet, "Hospitals: Planning against Noise," in which many practical hints are given for preventing unnecessary noise and for damping necessary noise with the soft pedal. It must be admitted that silence, if not exactly golden, is more costly than noise. Noise is more or less accentuated in direct ratio to the cheapness of the building materials, the fittings and finishings, and especially the mechanical equipment. But if a true economy is practised—planning for smaller maintenance costs years ahead, so that a proper initial outlay is made on massive and durable structure and good quality fittings—sound insulation can be secured

without undue extravagance in the long run. An important thing is for the various engineers concerned with the installation of electric light and power, heating and ventilation, and water supply to take thought properly to plan the wires, vents, ducts, and pipes, not allowing them to penetrate in a careless manner walls and floors on which money has been spent to improve sound insulation. The lift is generally a noisy element in any building. Doors, as a rule, are more silent than gates, though good anti-impact gates are now on the market. In the wards themselves a good deal can be done by means of furnishings, curtains and carpets, even pictures on the wall, to reduce noise and add homeliness at the same time. Floors of cork, rubber, and thick linoleum, laid in a mastic, and also wood block are all useful from the point of view of anti-noise, but ordinary board and batten floors, with an air space beneath, are noisy. Partitions ought either to be built double, without any approach of the two leaves, or to be at least 3 in. thick of a block as heavy as possible, not as light as possible, if they are not constructed of one of the insulating slab materials. Where glass is necessary for observation it should be at least 1/4 in. thick and in a heavy steel frame. These are but a few of the hints, as to both building and equipment, which are contained in the leaflet. Many of them are equally applicable to nursing homes, where too often quiet seems to be the last thing to be considered.

KING GEORGE AND QUEEN MARY AND THE CRIPPLED CHILDREN

We are indebted to Dr. Alfred Cox for the following "footnote" to our account of the visit of King George and Queen Mary to open the British Medical Association's House in Tavistock Square on July 13th, 1925: On the morning of the opening the mistress of the school for crippled and invalid children, which is held in the Mary Ward Settlement, came in to ask me if it would be possible for the children to get a glimpse of the King and Queen. She said they would be glad to put the children on forms in their grounds just outside our rails. I told her that the programme, which had been timed to the minute, did not include any visit of the Royal party to that side of the House. She seemed so disappointed that on the spur of the moment I rang up the King's secretary, and asked if a little deviation from the tour could be made. He asked for full particulars, which I gave him, went away, and came back with the message that the King would like to see the children. In due course the party made its deviation from the course laid down in the programme, and disappeared, to the surprise of the crowd in the courtyard. When the party reached the railings they found all the children sitting there in a state of great expectation, and they raised a cheer, which I am sure gave our Royal visitors as much pleasure as anything which had happened during the morning. Moreover, the Queen, finding that the gate between our premises and those of the Settlement was locked, asked if it could not be opened. We hadn't the key, but someone from the other side produced one, and the King and Queen went inside and spoke to several of the children. The incident touched all who witnessed it very much, and the mistress of the school afterwards told me that it had given great joy to the children. Thoughtful actions of this kind have done more to establish the Royal Family in the hearts of our people than all the formal ceremonies in which they take part.

ILLUMINATION OF TEST TYPES

It has been found that tests with test cards for defective sight may give different results according to the degree and standard of illumination of the cards. The question is of special importance to local authorities in connexion with certification under the Blind Persons Act, 1920, and the Minister of Health accordingly asked the Committee on the Prevention of Blindness to consider fixing a definite degree and standard of illumination of test types. The committee referred the matter to the Council of British Ophthalmologists and made a recommendation to the Minister based on the council's report, which the Minister has decided to accept. A circular has accordingly been issued by the Minister to the appropriate local authorities and voluntary associations for the blind informing them of what has taken place, and suggesting that test cards should be illuminated by artificial light in preference to daylight, and that the degree of illumination should not fall below 10 foot-candles—that is to say, illumination equivalent to that provided by a lamp of 10 candle-power a foot away. A method by which this can be effected is then set out. The circular (No. 1520) can be obtained price 1d. direct from H.M. Stationery Office, or through any bookseller.

HARVEY MEMORIAL TOWER

The present week of national mourning is perhaps an opportune one in which to bring to the notice of the medical profession once more the condition of the Harvey Memorial Tower at Hempstead Church in Essex. The work of restoration (which so far has been exceedingly well carried out) has proceeded, and about two-thirds of the structure has been restored; but the fund is now exhausted and the work has ceased. The last third, together with the rehanging of the bells, remains to be completed. A sum of approximately £2,000 is required for this purpose. Lord Horder has consented to become chairman of the committee, in place of the late Sir John Rose Bradford. Any donations should be made payable to the Harvey Memorial Fund and sent to Dr. G. de Bec Turtle, Royal College of Physicians, Pall Mall East, London, S.W.1.

We much regret to announce the sudden death, while returning from London to his home in Shropshire, of Professor William Blair-Bell, who held the chair of obstetrics and gynaecology in the University of Liverpool from 1921 to 1931, and was first president of the British College of Obstetricians and Gynaecologists.

Major-General Sir Robert McCarrison will give three Cantor Lectures, on "Nutrition and National Health," before the Royal Society of Arts (John Street, Adelphi, W.C.) on February 10th, 17th, and 24th, at 5 p.m. The lectures will be illustrated by lantern slides.

TREATMENT IN GENERAL PRACTICE

This article is one of a series on the management of some diseases of the digestive system met with in general practice.

HAEMATEMESIS AND MELAENA

BY

CHARLES BOLTON, C.B.E., M.D., D.Sc., F.R.C.P., F.R.S.

Haematemesis and melaena, or melaena alone, for each has the same significance—that is to say, bleeding from the lower oesophagus, stomach, or upper part of small intestine—may be profuse, moderate, or small in amount. Inasmuch, however, as a mild bleeding may be followed in three or four days by a profuse attack, every case in the first instance should be treated with great care and in the same way; although it is quite true that now and then one meets with a patient who has recovered without having consulted a doctor or who has had no treatment whatever.

Haematemesis, except when small in amount, is always due to the opening up of an artery or a vein, so that the treatment is precisely the same whatever may be the primary cause of the haemorrhage. In the later stages, when the bleeding has been arrested, a treatment appropriate to the disease giving rise to the haemorrhage is naturally to be adopted; and it is well to remember that the vast majority of cases of haematemesis are due to a peptic ulcer of the stomach or duodenum, because after the bleeding has stopped every case should receive a prolonged systematic treatment in order to promote the healing of the ulcer. A sudden haemorrhage without previous symptoms is almost always due to an acute peptic ulcer, rarely to a chronic one. Splenic anaemia may give trouble in diagnosis, because it does not produce gastric symptoms and bleeding may take place before the spleen is much enlarged, so that the latter may not be recognized owing to diminution in its volume from the loss of blood.

Haematemesis is always followed by melaena, and if this is absent the blood has probably been swallowed and subsequently vomited, or not been vomited at all. In such cases the cause should be searched for in the nose, pharynx, teeth, or lungs; the blood is usually small in amount, except in the rare condition of perforation of the oesophagus by an aneurysm.

The haemorrhage from a blood vessel in the stomach ceases as suddenly as it begins, owing to plugging of the vessel with a blood clot. Interference with this clot is the cause of recurrence of the bleeding, and is due to: (1) distension of the stomach, which opens up and stretches the ulcer; (2) the alternate contraction and relaxation of the muscular coats of the stomach, which dislodge the clot; (3) dilatation of the vessels due to active congestion during digestion; and (4) the gastric juice, which digests the clot. The aims of treatment are therefore directed towards keeping the stomach contracted, restraining its movements, maintaining the gastric glands in the resting state, and limiting vaso-dilatation. These are accomplished by securing complete rest for the stomach by the withdrawal of food and drink by the mouth, and by keeping the patient absolutely at rest physically and mentally.

Immediate Treatment

When a patient who has just had a profuse haematemesis is first seen a hypodermic injection of morphine hydrochloride, 1/3 to 1/2 grain, and atropine sulphate, 1/100 grain, is to be given at once, and the patient is to be made as comfortable as possible and kept perfectly quiet wherever he may be. After two or three hours the patient may be removed to bed in a quiet, well-ventilated room, the bed being so placed as to be free from draughts, and care being taken not to over-heat the room. The mattress should be firm and the bed coverings limited to a sheet and a blanket only, the pressure of these coverings being relieved if necessary by a cradle. The patient's head should be kept low and a hot-water bottle put at the foot of the bed, which it may be advisable to raise. The blinds should be partially drawn so that the face of the patient is well shaded, and he is encouraged to lie in the supine position at absolute rest. The application of ice to the epigastrium is not to be recommended.

The patient is not disturbed further for the first twelve hours. Whether the morphine should be repeated or not depends upon whether there is a further large haemorrhage and upon whether the patient is restless and sleepless, in which case it may be repeated in smaller doses—say, 1/6 to 1/4 grain for a few nights. As a rule haemorrhages, smaller in amount than the original loss, recur. They are announced by a rise in the pulse rate, feelings of faintness, giddiness, and sinking, and, perhaps, an increase in pallor. The intervals between them vary in length. There may be several attacks on the same day, or an interval of two or even six days may elapse; but after seven days' freedom it is almost certain that no further haemorrhage will take place.

The last sign of bleeding is always melaena, and its cessation, as judged by this sign, varies from three or four days to a fortnight from the commencement. Fresh melaena, as indicating the occurrence of haemorrhage, is coal-black, glistening, and viscid; or there is mixture with the fluid of a washout: this is black and quite likely to have small black clots floating in it. This must be distinguished from old melaena, because an enema may dislodge blackened and hard masses of faeces as long as a month after the onset of bleeding, the patient passing light-coloured soft motions at the same time. Food by the mouth is withheld till the bleeding has completely stopped for two or three days in most cases.

After the First Twelve Hours

In the meantime, after the first twelve hours cold water may occasionally be given to drink by the teaspoonful. If administered slowly in this way no harm is done, and it is gratifying to the patient whose mouth is dry and parched. The sucking of ice is not to be recommended. Fluid is introduced into the body per rectum, and half a pint of 5 per cent. glucose saline is run in every four hours by funnel, or the continuous-drip method is employed. This is supplemented by the subcutaneous injection of saline solution if the thirst remains acute. The rectum is to be washed out thoroughly once a day, and the mouth kept scrupulously clean at frequent intervals by some bland antiseptic solution, especially if the teeth and gums are not absolutely healthy. There is a diminished secretion of mucus from the buccal mucous membrane and of saliva from the salivary glands, due to depletion of the vascular system and also to lack of the stimulus of mastication. The mouth is dry, the tongue furs, and sordes collects on the lips. If the mouth is not kept scrupulously clean by the nurse the growth

of bacteria is encouraged and spreads up the parotid duct, the diminished flow of saliva favouring this; inflammation and suppuration of the parotid results, and the patient's life is thereby greatly endangered. Fortunately this formidable complication is rare.

Continued Vomiting

This state of affairs may be aggravated by vomiting, which, however, in my experience is rare, but hypersecretion is sometimes present and the flow of gastric juice is excited if blood remains in the stomach. The patient continually vomits intensely acid fluid containing blood in the form of "coffee-grounds." Such a case is to be treated by atropine, which not only arrests secretion but also dilates the pylorus. This drug is given by hypodermic injection as atropine sulphate, 1/100 to 1/50 grain, or by rectum as tinct. belladonnae, 20 to 30 minims; potassium bromide, 40 grains, may be combined with the belladonna and given by rectum if the vomiting is persistent. These drugs are repeated daily, or even twice daily, till a definite effect is produced. A close watch should be kept on the patient so that the atropine can be stopped if necessary. Small amounts of lime-water by mouth are also indicated.

The fever which most patients exhibit may be disregarded. It begins with a slight rise of temperature a few hours after the onset of bleeding or on the next day. It runs an irregular course, is not often over 100° F., and gradually reaches the normal a variable time after the bleeding has ceased.

Feeding by Mouth

In the general run of cases, when the bleeding has been finally arrested for two or three days, mouth-feeding is very carefully begun. Albumin water or whey is substituted for the water which has hitherto been allowed: these small quantities are gradually increased to 5 oz. every two hours. Equal parts of whey or albumin water and citrated milk (2 grains of sodium citrate to 1 oz. milk) are now substituted: citrated milk is then taken alone, and finally increased to 7 oz. every three hours. This stage would be normally reached in about ten days after the cessation of bleeding. In the meantime the rectal salines have been gradually reduced in number and at this stage are discontinued. An enema is given every other day in place of the daily washouts.

The dietetic treatment of ulcer, if the case is of such a nature, is to be continued from this point; otherwise, a more rapid advance in diet may be proceeded with. Wasting, the result of enforced absence of food, is an invariable accompaniment of this treatment, but no untoward result ever eventuates from it, and the normal weight is soon regained if a properly graduated diet is introduced. For the very rare complication of blindness and venous thrombosis there is no special treatment. Four methods of treatment remain to be considered.

Use of Haemostatics

Haemostatics, upon which the older physicians placed so much reliance, are probably of no use whatever. Three types of such remedies have been employed for many years. Haemostatic substances which precipitate the blood plasma (iron perchloride, for example) are given in the endeavour to block up the mouth of the artery; but it is difficult to see how any substance taken by the mouth could, owing to dilution, be of value; moreover, the clot formed by them is of a loose texture only. Adrenaline, which causes contraction of the blood vessels when applied locally, can only be of use if the stomach has been washed out previously. Attempts to increase the coagulability of the blood have been made by the administration of calcium salts, and also by the subcutaneous or intravenous injection of haemostatic serum. Calcium is, however, useless, and there is no positive evidence that the latter method is of any more value.

Gastric Lavage

Lavage of the stomach has been practised on and off for over twenty years. Theoretically it is a sound idea, for blood retained in the stomach, partially digested and mixed with gastric juice, is inimical to the arrest of haemorrhage. Either hot or ice-cold water or astringent solutions have been employed. The blood is sucked out of the stomach by an evacuator, and a few ounces of water introduced and removed till the washings are clear. The astringent is then poured in. It is difficult to empty the stomach completely, and in order to do so the tube must be introduced into the lowest part of the stomach. The protecting clot is very likely to be dislodged, as the tube may come into direct contact with the ulcer, and at all events the mucous membrane is subjected to suction. This is not a method to be lightly undertaken.

Blood Transfusion

The mortality from haematemesis is small, and occasionally a patient who appears to be *in extremis* will recover, but, on the other hand, an apparently moderately severe case now and then proves fatal. There is thus always a degree of uncertainty at the onset, and blood transfusion should therefore always be an available method. It is a good plan to have the patient's blood grouped straight away in all cases. Much has been written about its usefulness as a means of treatment, and it is undoubtedly a valuable method, although it must be acknowledged that there is no definite pathognomonic indication for its employment. Haematemesis does not prove fatal after the initial attack, but after repetitions due to dislodgement of the clot, and it is after one or more repetitions that transfusion is to be done as decided by the physician.

As regards the danger of recurrence of haemorrhage following raised blood pressure due to the transfusion, practical experience has shown that this is not great, and two transfusions of 250 c.cm. each, with an interval of two hours between, is perhaps the best method of administration. There are three points of assistance in deciding whether it is advisable to transfuse, but they must be considered together. The first is the general clinical picture presented by the patient and assessed after review of the case in all its aspects. The other points are the character of the pulse and the percentage of haemoglobin in the blood. We do not know the normal blood pressure of our patient, so that the value of the readings during haemorrhage are uncertain; and after transfusion the pressure may fall and yet the patient recover. The rate of the pulse is perhaps of greater value, but sometimes it may not be much over 100 till just before death. A haemoglobin reading of 30 to 40 indicates danger, although the patient may appear to be quite comfortable.

Operation

There is a great deal of risk in operating; this is, of course, minimized by transfusion. If an acute peptic ulcer is thought to be present the case is better left alone, because there is no external indication of the presence of the ulcer, and the stomach must be opened to deal with the bleeding point. The search for this may be difficult and the ulcer often not found, in which case the patient is almost certain to die. On the other hand, a chronic ulcer is easily found, and such a case should be operated on if the recurring haemorrhage is persistent or if pyloric stenosis is present.

CONFERENCE ON MENTAL HEALTH

LONDON, JANUARY, 1936

The fourth biennial Conference on Mental Health, organized by the National Council for Mental Hygiene and attended by delegates from authorities under the Lunacy and Mental Treatment Acts and from local education authorities, was held at the Central Hall, Westminster, for three days, beginning on January 25th. There were seven sessions, at which problems as various as domestic relations, the education of the young child, and the role of the priest and the doctor in the treatment of nervous and mental disorders were discussed. The chairman of the opening session was to have been the Duke of Kent, president of the National Council, who was prevented from attending by the royal mourning. The first act of the Conference was to express dutiful homage to the dead and respectful sympathy with the living.

An International Outlook

The Conference began with an international outlook, and two principal speakers discussed the problems of war and peace from the unusual standpoint of mental hygiene. Lord ALLEN OF HURTWOOD, who said some very pungent things in the gentlest possible manner, found an explanation of recent events in Italy and Germany in the mental ill-health of statesman. "Modern nations have, in fact, been driven forward to policies, both unnecessary and evil, by nothing more nor less than bad mental health on the part of all concerned." The evils of the Treaty of Versailles might have been due, not only to what happened in the mirrored hall of a French palace, but to life in an ill-ventilated nursery, ruled by a tired nurse, visited by a preoccupied father, or brooded over by a too-loving mother.

Dr. WILLIAM BROWN, Wilde Reader in Mental Philosophy at Oxford, followed with a discerning analysis of the causes of war. In time of war, he said, it was not only armies and navies that were mobilized: there was a mobilization of the unconscious, an emergence of primitive tendencies, which showed themselves uncensored and unreproved. These unconscious urges were not just skeletons in the dark cupboard, but very live and potent forces, ordinarily held in check by our conscious aims and purposes, and in general by our culture and our sense of what was due to others and admirable in ourselves. It was rightly said that moral must precede material disarmament, but even before moral disarmament, as a condition precedent to it, there must be an analysis and assessment taking account of those "inward parts" which on the highest of all authority may be full of "ravening and wickedness."

Mental Health Services

From subjects of such wide range the Conference recalled itself on the following morning to a discussion on the organization and correlation of mental health services in local areas. Dr. ARTHUR MACNALTY, Chief Medical Officer of the Ministry of Health and Board of Education, who took the chair, said that the total amount of mental disease and incompetence was a serious handicap to the efficiency of the nation. One of the causes was the increased competition and pressure of modern life, whereby work which took a week to accomplish in a more leisured age was now done in a day, and too often the tired cells of the brain never got time to recuperate. The lot of the mentally afflicted had been greatly ameliorated during the last hundred years, and in recent times the most important legislative advance had been the Mental Treatment Act, 1930. It was now understood that much more mental disease was preventible than was formerly imagined. Many forms of mental disease had an organic basis. Chronic toxaemia was an important factor. Insanity due to syphilis, tuberculosis, alcoholism, and the puerperium had been recognized, and much of this was preventible, and the health services and propaganda of local authorities could be brought into play to aid in such prevention. The great difficulty was to co-ordinate and apply all the varied knowledge now available. He urged, in particular, the setting up of more out-patient clinics for the treatment as well as the detection of early mental disorder.

Dr. MacNalty went on to suggest two general considerations to be borne in mind by authorities. The first was that any correlation between the services dealing with mental disorder and those dealing with mental deficiency must take into account the fact that the relatives of mental defectives were often averse from any suggested connexion with mental disorder, or, to use the old term, lunacy, and due weight must be given to such feeling or prejudice. The second was that any correlation to be of value must be precisely defined.

Correlation of Services

Professor R. M. F. PICKEN (Cardiff) said that at first sight it might seem to be a simple matter for the larger authorities to determine that one committee should be responsible for the handling of mental disease and mental deficiency. But the law put very definite obstacles in the way of such policy, and on examining the machinery which the various committees had established in the exercise of their functions in respect of these problems as affecting various ages and classes of the community it would be found that there was no single Gordian knot to be cut. The tangle of overlapping powers, duties, interests, and provisions could not be unravelled merely by the appointment of an *ad hoc* committee charged with the responsibility for the care of the mentally diseased and defective. But there appeared to be no reason why visiting and mental deficiency committees, which usually consisted of almost entirely the same persons, should not be statutorily one body, to be designated the "mental health committee." Education and public assistance committees would still, almost certainly, retain many of their powers and duties in relation to the mentally unsound or defective, and any new committee would, for some time at least, be dependent upon these or other committees for the care of some of its patients.

After a survey of the duties which might fall to such a mental health committee Professor Picken went on to urge that the department attached to the committee should be that of the medical officer of health. Until now mental deficiency had usually been handled wholly or partly by that department, while mental disease had centred round the mental hospital and its superintendent, but if there was to be unification it seemed that one of these organizations must take over both functions. Here he quoted the Annual Report for 1934 of the Chief Medical Officer of the Ministry of Health, that all the medical services of a local authority should be closely co-ordinated under the general supervision of the medical officer of health. He believed that the medical officer of health was already responsible for the mental service in Scotland.

The weight of administrative and professional opinion, said Professor Picken, favoured unification of all health services, physical and mental, within one department, though such a policy would entail that every department of the kind should have a specialist officer in charge of the section concerned with the mental service, and the medical officer of health and his committee would depend upon this officer in regard to specialized matters of detail. It seemed to him that the machinery of local government had now become sufficiently standardized to admit of this line of departmental development if such an *ad hoc* committee for dealing with mental disease and defect became statutory.

Social Services for Mental Health

A paper dealing with the details of local organization of services was read by Miss EVELYN FOX, honorary secretary of the Central Association for Mental Welfare. She drew attention in particular to a possible scheme, already adopted by some local authorities, under which the county or county borough medical officer of health employed on his staff specialized mental health workers in addition to the ordinary health visitors. The method

was in use in many areas in connexion with mental deficiency work, but it had not, so far as she was aware, been tried on a scale so extensive as to place at the disposal of the medical superintendents of mental hospitals and directors of mental treatment clinics or child guidance clinics under the local authorities the services of fully trained mental health workers who, whilst not exclusively on the staffs of those institutions, could work under their direction.

Dr. T. S. GOOD, medical superintendent, County and City Mental Hospital, Littlemore, followed with a description of the ideal organization of the mental hospital, the out-patient clinic, the child guidance clinic, and the mental deficiency clinic. The out-patient clinic should, if possible, be held at the general hospital, and while its director should be the head of the mental hospital it appeared advisable that a general practitioner with a large experience in the treatment of mental disorders should be his colleague, thus achieving a thorough correlation between general medicine and mental illness. Another advantage was that cases could be referred to other departments at the general hospital. With regard to the general question of administration of mental health services, Dr. Good thought it advisable that all the several services should be under one director, who should act with the medical officer of health for the area, a liaison which had proved of value in his own locality.

In some brief but pointed discussion following the three papers on this subject Dr. J. GREENWOOD WILSON, M.O.H., Cardiff, said that he always felt that in the sphere of public health the law was too much with them. If a doctor wanted to send a patient suffering from physical illness to a specialist at a hospital he had merely to write a note, but if he wanted to send a patient suffering from mental illness he had to fill in a legal document. One of the certificates used for certifying mental defectives for institutional treatment had to be filled in by the medical officer of health, who might have had special training and be able to say that the patient had a certain intelligence quotient, but the certificate would be sent back to him from the Board of Control because he had not used "the out-of-date verbiage of the Mental Deficiency Act." The speaker said that he had just been reading the draft of the new Public Health Bill, and felt that here at last was order out of chaos, but he wished the same departmental committee could continue to sit and codify the legislation dealing with mental cases, only he prayed that it might be weighted with medical men rather than with lawyers.

Sir LAURENCE BROCK, Chairman of the Board of Control, said that the subject was rather more difficult than the optimism of Professor Picken might suggest. He realized the advantages of unification and the need for it, but it had to come slowly, by gradual evolution, and possibly with mistakes, so that steps would have to be retraced. At the present time the medical officer of health had to cover an enormous field, and, in general, he did not possess acquaintance with the special difficulties of the mental institutional services, which was necessary if he was going to handle them with sympathy and understanding and restraint. He was well aware that psychological medicine had suffered in the past from being in a watertight compartment, isolated from the main body of general medicine, and anything which cut it off from the rest of the health services was bad, but a policy of correlation—well, he did not want to exaggerate its difficulties, but they were very real, human nature being what it was, and medical officers of health and psychiatrists being what they were. With good will the end would be reached at length, but it would only be by gradual change.

Professor PICKEN, in the course of his reply, said that no doubt, as Sir Laurence Brock had indicated, the situation was complicated by the peculiarities of medical officers of health and psychiatrists, but perhaps he might add, still further complicated by the peculiarities of Government officials!

From these technical administrative subjects the Conference turned to something more human—namely, problems of marriage, from the special point of view of the establishment of "courts of domestic relations."

Problems of Domestic Relations

Dr. HELEN BOYLE of the Lady Chichester Hospital, Hove, opened with a paper in which she pointed out that there were marriage problems of a psychological and medical nature likely to cause a matrimonial breakdown, and possibly to bring the parties into court, and that such problems could best be dealt with after a clear understanding of them had been acquired privately, in many cases with the help of a psychiatrist and social service reports. It should be mentioned that there is now sitting a Home Office committee called "Summary Courts (Social Services) Committee," which is to inquire, among other things, into the application of conciliation methods to matrimonial disputes. Dr. Boyle touched skilfully upon the enormous variety of difficulties in married life which might require adjustment. They ranged from the question of wearing a permanent wave or engaging a charwoman up to complicated psychological situations, which called for an immense amount of patience and faith in both the parties, and, for that matter, in the doctor also, if the faulty attitudes and want of understanding were to be overcome. Dr. Boyle boldly declared that the enormous majority of marriages were happy, though not carefree or cloudless, or without a good deal of quarrelling and disagreement. She doubted whether the Dunmow Flitch was awarded to the right people. When they never differed it was pretty certain that one or other was being firmly "sat upon," and it was just in such cases that the curious phenomenon occurred of a sudden breakaway, the self-repression being no longer possible, so that flight—perhaps suicide—was the only relief. Another wise remark of Dr. Boyle was that far more marriages were thought to be unhappy than was really the case, and the children of the marriage were most prone to make that mistake, thus accepting a strain and misery for themselves which was quite unnecessary, and might show in their behaviour. Sons and daughters would sometimes justify their own shirking of life and of reality, and their childish desire to retain the protection of the home, by arguing that they must remain in order to protect one parent from the other.

Dr. Boyle's argument was that even in the less involved cases it was difficult to get a true picture of any matrimonial situation in the publicity of the open court. Indeed, until a case was carefully investigated it was impossible to say that it did come into the category of the less involved, for it was rare for the true basis of the difficulty to emerge at once. The fundamental understanding of the kinks in human nature which might lead to the court was not come by easily, and any procedure and any service, psychiatric or other, which led to it was worth utilizing even if it cost something.

Mrs. NEVILLE-ROLFE, secretary-general of the British Social Hygiene Council, urged that closer co-operation between the social services and the courts might do something to mitigate not only the suffering of the individuals concerned, but the damage done to the children of the future. Finally, Mr. CLAUD MULLINS, metropolitan police-court magistrate, pleaded for a more humane and intelligent procedure for matrimonial cases in magistrates' courts. He wanted divorce to be brought within magisterial jurisdiction—though he was not prepared at present to recommend that magistrates' courts should grant decrees—because in that way the humble petitioner might automatically have at his (or usually her) disposal the services of social, religious, and, he hoped, medical workers. Those who sought the irretrievable step of divorce needed conciliation machinery, such as magistrates' courts might put into operation, even more than those who merely sought separation. However, big changes were expected to follow the report of the Home Office Departmental Committee.

The Priest and the Doctor in Nerve Cases

The BISHOP OF SOUTHWARK presided at a special session when the subject was the role of the priest and the doctor in the treatment of nervous and mental disorders. He confessed that he had found himself often unfitted to deal with the moral problems which were brought to

him because he was not sufficiently acquainted with the principles of mental and physical health and disease. Were he a doctor of bodies he would be a much more useful physician of souls, and perhaps the same might be true the other way round. The clergy were often required to undertake difficult and delicate tasks for which they felt themselves not fully equipped.

Dr. H. CRICHTON-MILLER, the founder and honorary senior physician of the Institute of Medical Psychology, began by pointing out the inevitable complexity of causation, and therefore of treatment, of nervous and mental disorders. It was necessary to guard against the facile acceptance of a single explanation of a disorder, because that, more than anything, led to partial, and therefore ineffective, treatment. In functional disorders there were three main sources of maladjustment to be considered. The first was fear—fear of death for the most part, of pain often, of hell-fire sometimes, of social and economic frustration very frequently. The one method which the doctor commanded for the treatment of fear was reassurance, and not infrequently the organic factor was so trivial and the fear factor so preponderating that the cure was effected by the doctor's words and manner rather than by his pills and potions. But what of the situations in which fear was well grounded, when the facts left no room for hope, and the doctor's reassurance could only be a pretence? The doctor had no alternative method, and therefore there was need for some other form of help and guidance. Not all priests were fitted to assist the patient to make the necessary philosophic adjustment. A special consideration was that reassurance had therapeutic value entirely apart from its validity, and thus patients who had been told by an honest doctor that their condition was irremediable were found resorting to charlatans—either medical or religious—and claiming to derive benefit from their blatant and ignorant assurances. All vital processes were deranged by fear, and if a patient accepted the proffered reassurance and achieved equanimity in place of apprehension a relative improvement in physiological functioning was bound to follow. All that it proved was that the patient had accepted the reassurance, nothing more, but it was invariably interpreted as much more, as proving the validity of the osteopathic hypothesis, the brilliance of Continental surgeons, the merciful intervention of a God, and so on. Dr. Crichton-Miller dealt with similar incisiveness with the two other major causes of maladjustment—namely, guilt and inferiority. He submitted certain formulations.

1. The essential function which most of us attribute to God is to maintain a trustworthy universe. This is the expression of His omnipotence, and is compatible with every demand of science.

2. No religious system which postulates special providences or divine caprice is compatible with scientific medicine.

3. No religious system which promotes evasion, rather than adjustment, can command the respect of serious-minded doctors.

4. No doctor can effectively deal with the functional factor in disease unless he recognizes the importance of unconscious motivation and philosophic valuation.

5. If the function of the doctor is to allay pain, that of the priest is to bring all suffering into line with evolutionary progress and spiritual development.

6. The priest stands for institutional authority, creed, and dogma; these elements are not essential to a dynamic personal religion.

Canon T. W. PYM of Balliol College dealt with some of the difficulties of ministers of religion in cases of mental stress. Nowhere could he find any clear guidance as to symptoms. As a ministering priest he had to settle whether or not such a person was in real need of medical help. It might be suggested that all that was wanted was the opinion of the local general practitioner, but that was often no good, for what the priest thought to be signs of possibly serious psychological malady the practitioner judged to be signs merely of overwork, and prescribed rest and a tonic; and the local provincial neurologist or psychiatrist would not take any patient except through a general practitioner. "I always resist it, but the temptation is now very strong to some of us priests to try some unprofessional psychiatry."

A further paper on the subject was read by Mr. Z. F. WILLIS of the Y.M.C.A., and there was a brief discussion, which rather wandered from the subject, with suggestions on the part of one speaker that the Church and medicine should get together to decide how to prepare people for marriage, and on the part of another that both professions should make a careful study of the normal child.

The Young Child

The final day of the Conference was devoted to general papers on education for living. The first was by Dr. R. G. GORDON of Bath, who spoke on the mental health of the child during his first eight years. He traced in an interesting fashion the emotional development of the young child, and showed how easily friction and conflicts arose. "The relationship of the child to his parents should be as an equilateral triangle, with constant and equal bonds of affection and trust between all three. Any breaking of these bonds, whether between mother and father or between either parent and child, is putting a great handicap on the child, and is bound to produce a distortion in his emotional growth." Dr. Gordon said that 50 per cent. of the children brought to the clinic in which he was interested came from broken homes, and there could be no doubt that divided loyalties, starting in the home, would too often be reflected by divided loyalties between home and school, and a development in the growing child of a low cunning by which he played off one against the other, or of a sense of bewilderment so that he found no sure footing in the shifting sands of life. Recent work had thrown a good deal of light on the nature and prevalence of eidetic imagery, a form of imagery so vivid that, like the true hallucination, it could not be distinguished from reality. If it took the form of alarming imaginings it might have a serious effect on the emotional stability both in childhood and in later life. With these and other examples Dr. Gordon pointed out how important it was to find out as much as possible about the emotional life of the child in order that his emotional education might be made as efficient as possible by realizing difficulties and danger points, and removing them as far as was advantageous to the child. In child guidance clinics it was essential to gain objective insight into this emotional life, which was best done by observing spontaneous play. In his play a child often worked out his emotional problems and conflicts. Aggressiveness, spite, jealousies, and fears might all be demonstrated. In conclusion, the speaker uttered a note of warning, that in all this study of the emotional life of the child, absorbing as it was, a just sense of proportion must be observed. There was no rule of thumb about these things. Every child was a law unto himself, and a separate problem.

Madame MONTESSORI, the well-known educationist of Rome, who spoke through an interpreter, addressed herself to what she called the "sensitive periods" of a child's existence—a succession of intense and keen emotions surging up one after another from the unconscious. A child who had been thwarted in one of its sensitive periods, prevented from behaving in accordance with its inner promptings, had lost, and lost for ever, that particular chance of natural growth. The whims and fads of each "sensitive period" were the outward expression of special needs unsatisfied, symptoms revealing a dangerous condition which must be understood and appeased. Another speaker in this discussion was Miss J. A. CALLARD of the National Union of Teachers, who stressed the need for greater provision for younger children. The only child needed the society of other children, otherwise its all-round development might be impeded, while the child in the large family needed better material and social environment than economic circumstances could usually provide in the home. She pleaded for nursery schools and classes for children over 2 and under 5, whose attendance at such schools and classes was necessary or desirable for their healthy physical and mental development.

The ensuing discussion brought out one definition of education, that it was "a means of ensuring that th

rising generation does not rebel against the traditions and superstitions of its elders"!

The Older Child

At a later session, dealing with the ages 8 to 14, Dr. J. ALISON GLOVER, Senior Medical Officer to the Board of Education, was in the chair. He said that during the years 11 to 14 the child was as a rule extraordinarily sensitive to praise and blame. Judicious praise was specially important during this period, and, on the other hand, a cruel, unjust, or harsh word might leave something corresponding to a physical scar upon the memory. Dr. Glover also mentioned that he had been recently rather surprised, on looking at the elaborate tables for recording observations at a child guidance clinic, to find no space provided for recording the weight of the child—a most important sign of bodily fitness.

Dr. EMANUEL MILLER, honorary director of the Child Guidance Unit, West End Hospital for Nervous Diseases, who read the opening paper, said that it was in the first five years that the major conflicts of life were faced and dealt with. Neuroses and character formation were the resultants of those conflicts; intelligence alone remained to develop. Neurosis apart, by the time the child had entered its sixth year it had successfully repressed certain tendencies and was free to enter the social life of school and community by adjusting such emotions as had been left free from the childhood period to the new social life which it wished to enjoy. Before teachers set to work on the child between 8 and 14 they ought to be provided with such knowledge of its earlier years as was put into the hands of physicians and social workers in child guidance clinics. They should know whether they were handling porcelain or earthenware, a vessel with an emotional leak, or one capable of holding all that was put into it. He gave some indications of peculiarities in character which called for special handling, and the ends to which the moulding of the child should be designed, as, for instance, to remove anxiety or excessive obsessional symptoms by active treatment, to obviate frustration by love (for example, in establishing parent substitutes), to afford outlets for aggression in group play, and "to condone, in a reasonable measure, vulgarity."

Miss M. WITHERS, head mistress of a junior girls' school, Barking, gave the experience of a very sympathetic teacher in an approach to young girls. It is sufficient to quote one sentence from her paper: "I count time well spent when work is laid aside to gaze at a rainbow." Miss F. HAWTREY, principal of Avery Hill Training College, pleaded for beautiful schools—schools as beautiful as were the churches of long ago. The general discussion centred chiefly round the juvenile court, as to which diametrically opposed opinions were expressed. Dr. DORIS ODLUM raised the question of biological teaching in schools. The National Council for Mental Hygiene, the Eugenics Education Society, and the British Social Hygiene Council were pressing that such biological teaching should not concern itself only with plant and animal life, but be carried a step further to include human biology, especially in relation to the reproductive functions.

The final session of the Conference was wholly educational. Mr. R. E. ROPER, late director of physical education, Bedales School, gave some startling figures as to young people at present being turned out of school without employment or prospect of it. Miss GRACE HADOW, principal of the Society of Oxford Home Students, gave the results of a sympathetic study of the girls from secondary schools who came up to Oxford. Oxford, she said, was turning out not only good doctors and lawyers, but good wives and mothers. The last paper of all was by Mr. G. A. LYWARD, director of Finchden Manor School, Tenterden, who spoke of a testing out with neurotic boys of views he had long held concerning the vital need for a new teaching technique.

A luncheon which was to have been held in connexion with the Conference was cancelled. The Minister of Health, who was to have been the guest, sent his good wishes for the success of the Conference, saying that mental health was of no less—perhaps even of greater—importance to the community than the health of the body.

BACTERIOLOGICAL GRADING OF MILK

A SURVEY OF TECHNICAL PROCEDURES

The following is a summary of the principal findings in an important monograph[1] on this subject now published by Professor G. S. Wilson and others as a report to the Medical Research Council. It should be understood that under the Milk (Special Designations) Order of 1923, grades of milk were defined which must conform to certain bacteriological standards. The two main laboratory proceedings are the total bacterial count and the test for *B. coli*: the former is ascertained by colony counts in plate cultures (using a medium of prescribed composition) made from decimal dilutions of the milk; this count must not exceed 30,000 per c.cm. in "Certified" and "Grade A Pasteurized" milk; 100,000 per c.cm. in "Pasteurized" milk; and 200,000 per c.cm. in "Grade A (tuberculin-tested)" and "Grade A" milk. *B. coli* must not be present in 1/10 c.cm. of the two former grades, or in 1/100 c.cm. of the two latter.

It is with the technique, the reliability, and the significance of these tests that this report deals. The general conclusion is that they are unsatisfactory, and another test of a wholly different nature is proposed as a substitute for them. The report is not concerned with any regulation governing the presence in milk of specific pathogens such as the tubercle bacillus or with proceedings to ascertain their presence.

Collection of Samples: Their Treatment Before Examination

Methods of taking samples from churns and other containers are discussed, emphasis being laid on the importance of a homogeneous sample—that is, one in which constituents which tend to separate on standing are well mixed. Experiments showed that aeration and shaking both led to an increase in the count; it is therefore recommended that sample bottles be completely filled. A distinction is drawn between producers' and distributors' milk in suggesting conditions under which milk should be held before examination; the latter should be kept cold and the former at atmospheric temperature in order that such changes as would naturally take place in it may proceed.

The Technique of Dilution

Exhaustive studies were made of the merits and accuracy of different types of pipette and different methods of employing them. The type recommended is a straight-sided pipette made to *deliver* the required amount. Experiments of considerable interest outside the confines of the subject itself were made on the effect of different diluents; metal-distilled water is bactericidal, glass-distilled water causes a raised count (apparently due to a dispersive action on clumps of bacteria), and the action of tap waters varies. The diluent recommended is Ringer's solution, itself diluted 1 in 4. The error consequent on using the same pipette for more than one dilution is emphasized and illustrated by experiment. Parallel experiments showed that a higher count was obtained when dilutions were made by the Ministry of Health technique, bottles being employed (10 c.cm. and 90 c.cm.), than when tubes (1 c.cm. and 9 c.cm.) were used: this difference was eventually attributed to the breaking up of bacterial clumps by the vigorous shaking of the bottles, admixture by sucking in and out of the pipette when tubes were used having less effect in this direction. The tube method is preferred.

[1] *The Bacteriological Grading of Milk.* A Critical Study by Professor G. S. Wilson, M.D., F.R.C.P., assisted by R. S. Twigg, R. C. Wright, Catherine B. Hendry, M. Penelope Cowell, and Irene Maier. Special Report Series, Medical Research Council, No. 206. H.M. Stationery Office. (7s. 6d.)

The Culture Medium

The official medium (0.5 per cent. peptone, 0.3 per cent. lemco, 1.5 per cent. agar in tap water) has received a good deal of sharp criticism in the past, chiefly on the ground that some bacteria occurring in milk will not grow in it. Extensive experiments were made to devise a medium giving better growth, the method being to compare the counts obtained in media containing different peptones in combination with one meat extract, and then those with different meat and vegetable extracts and the best of the peptones as already ascertained. The best combination was found to be " yeastrel " (a yeast extract) and B.D.H. peptone ; it is suggested that the medium also contain 1 per cent. of added milk and be adjusted to a *p*H of 7.2. The count obtained was found to vary with the volume of medium employed, for reasons which, in spite of exhaustive investigation, do not appear to have been made wholly clear. The volume per plate recommended is 10 c.cm. In the making of plates it was found best to pipette the inoculum into the empty plate and add the medium to it at a temperature of 45° C.

Incubation

Attention is drawn to the large variations in temperature that may exist in different parts of an incubator, a matter of considerable general importance. Water-jacketed, gas-heated incubators are less at fault in this respect than electric anhydrous incubators, and stacking plates is preferable to staggering them. The optimum temperature for incubation is discussed, having in view the fact that at least three main classes of bacteria may occur in milk, growing best, respectively, at about 37° C., at a point well below this temperature (these being the types predominating in dirty milk), and at a point well above it (thermophiles). Adherence to the present standard temperature of 37° C. is recommended.

Counting Colonies

It is recommended that proper illumination of a plate for counting be secured by placing it in a specially designed box in which oblique light is supplied from two sources, and that only those colonies be counted which can be distinguished with a lens having a magnification of $2\frac{1}{2}$ diameters. In extensive studies in which the same plates were counted by twelve different workers considerable variation in results arose, the causes of which are analysed ; one of the principal of these is the formation of colonies on the borderline of visibility, by whatever method of illumination and magnification may be employed. The " overcrowding " error (a proportion of bacteria not developing into visible colonies when too many are present) and the sampling error (operating when the number is too small) were studied, with the conclusion that results should be based on plates containing not fewer than thirty and not more than 500 (preferably 300) colonies. The mean standard error, ascertained by making and counting multiple plates from the same inoculum, was found to be 13 per cent. The total error of the whole method was studied in a number of different ways, and can therefore only be expressed in different terms, but the general conclusion is that with a carefully standardized technique the result is correct only within the limits of $\pm$ 90 per cent.

The Coliform Count

No short summary can represent the very extensive investigations undertaken in this connexion. They consisted, in the first place, in collecting 648 strains of coliform bacilli from sources connected with milk (cow-dung, foodstuffs, and milk itself) and classifying them on the basis of a long series of cultural and biochemical tests, with the object of ascertaining whether these characters could be related to the source of origin: the generally accepted conclusion was confirmed that *B. coli* is of directly excremental origin and that *B. aerogenes* is derived from extraneous material. Methods of enumerating coliform bacilli were studied most thoroughly, and some are proposed which are suitable for detailed study and research purposes but too elaborate for a routine test. For the latter, if it is to be used, it is suggested that no attempt should be made actually to enumerate these bacteria, but only to ascertain whether more or less than a standard number are present: this necessitates the use of multiple tubes of McConkey broth (for example, five for each of three milk dilutions) and the calculation of the probable number from tables.

The Methylene-blue Reduction Test

A large section of the report is occupied by a consideration of this test and with details of numerous new observations connected with it. That methylene-blue and other dyes are decolorized as a consequence of bacterial growth in milk has long been recognized: here the mechanism of this effect is analysed, and its rapidity is brought into relation with numerous factors—chemical, thermal, and bacterial—which may affect it. A new method of performing the test is proposed, of which the principal feature is the inversion of the tubes at regular intervals in order to maintain the fat in a state of dispersion. The findings of this test performed on a large number of milks are closely compared with those of the plate count and of other methods of test, and these, in turn, with conditions of production expressed in a numerical form. It is claimed that the methylene-blue reduction test affords a better index of bacterial activity than the plate count, besides, of course, being much simpler to perform. The term " activity " here is significant: it has been shown conclusively that bacterial metabolism in the long phase, with little or no demonstrable multiplication taking place, may be reflected in a short reduction time. The total error of the test, using the technique proposed, is said to be small. Emphasis is laid on the fact that its simplicity enables tests to be regularly repeated at frequent intervals, thus affording a fair and representative picture of over-all quality, in contrast with the injustice of depending, for example, on the plate count from a single sample.

Other Tests

Among other tests the titration of acidity, the estimation of *p*H, the brom-thymol-blue test, the keeping quality test, and several others are considered to have little value. The Breed smears method, which consists of counting bacteria or groups of bacteria in a stained film made directly from a measured volume of milk spread over a measured area on a slide, is commended as a simple and rapid means of estimating the quantity of bacteria in a milk, equal at least in merit in some respects to the plate count and not grossly inaccurate when sufficient numbers of bacteria are present.

General Conclusions

The authors of this report are chiefly concerned to simplify methods of grading and testing milk, to make at least some test of general application, and to do away with numerically expressed results which have a false appearance of accuracy. The recommendations in the earlier part of the report, particularly those on the technique of the plate count, are conditional on the continued employment of certain methods, some of which are emphatically condemned or severely restricted in their suggested application. The main conclusions are that the results of a plate count depend on so many factors apart from technique—on the types of bacteria present, their nutritional and temperature requirements, and the extent of their aggregation into clumps, to name only the most important—that the subdivision of milk into several grades on this basis, and still more the finer subdivision involved in clean milk competitions, is to credit this method with an accuracy and a significance which it is far from possessing. That the methylene-blue reduction

tests should replace the plate count, at least for the routine grading of raw milk, is the principal recommendation made. In other directions recommendations are less conclusive, since the tests used must depend on the grading adopted in the future, and it is the authors' opinion that this should be changed in the direction of greater simplicity: they even go so far as to suggest that from the point of view of cleanliness milk need only be classed as either fit or not fit for consumption as milk.

That all milk should be graded instead of only a small proportion of that sold, the remainder being subject to no restrictions whatever, is the most far-reaching of the conclusions expressed. It is recognized that for freshly pasteurized milk some other method than the methylene-blue reduction test is necessary, and here the coliform test finds its only approved use. No attempt, however, is made to state hard-and-fast conclusions which would form the whole detailed basis of a new milk policy. The report is concerned with principles, and with their illustration by experiment on a scale quite unprecedented in this branch of work. How its findings will be translated into practice remains to be seen.

SALE OF MEDICAL PRACTICES

PURCHASE PRICE PAYABLE BY INSTALMENTS

[FROM OUR INCOME TAX CORRESPONDENT]

It happens not infrequently that when a medical practice, or a share in a practice, is sold, one of the arrangements made is that the payment shall be spread over a few years in order to meet the convenience of the purchaser. In such a case it is important that the nature of the arrangement should not affect the normal incidence of the income tax as between vendor and purchaser. Both parties would naturally regard such payments as of a capital nature, and one which should not affect the income tax liability of either, but there is a distinct possibility that the terms of the agreement for sale might be such as to render the payments "income" from the point of view of the vendor. With a standard rate of income tax of 4s. 6d. in the £ the result would be to reduce the intended selling price of the practice by 22½ per cent., or more if surtax were involved.

A Recent Case

In a case[1] before the Court of Appeal in December last the agreement for the sale of a dental practice provided for a primary price of £15,000, £5,000 to be paid down and the balance at the rate of 25 per cent. of the net profits of the practice for ten years. So far the arrangement was fairly simple: it fixed a capital purchase price, and the subsequent clause would be interpreted merely as laying down the method of payment. But the agreement went further. It provided that in the event of the aggregate of the original £5,000 plus the ten payments on the 25 per cent. basis being less than, or greater than, £15,000, then that amount was to be regarded as diminished or increased accordingly. If the agreement had omitted the specified sum of £15,000 and provided that the purchase price was to be £5,000 down plus ten payments of 25 per cent. of the subsequent ten years' profits, the result apart from income tax would have been the same. But according to rules established by previous decisions the ten payments would have amounted to a ten years' varying annuity, which would have been income in the hands of the vendor of the practice and deductible for surtax purposes by the purchaser. The point before the Court was whether the actual agreement made was a sale for a capital sum, to be paid in instalments, or for a specified but varying annuity. That the point was one of some difficulty is shown by the fact that the King's Bench Division decided for the latter and the Court of Appeal for the former alternative.

[1] Commissioners of Inland Revenue *v.* Ramsay.

Conclusion

The lesson to be drawn from the case is the importance to the vendor of a practice of seeing that a capital sum is specified as the selling price, and that in any spreading out of the actual payment the principle that such payments are instalments of the original capital sum is kept intact.

TESTIMONIAL TO DR. E. R. FOTHERGILL

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The following is the first list of contributors to the Fothergill Testimonial Fund, in response to the letter published in our correspondence columns on January 18th (p. 130).

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Cheques should be made payable to the Fothergill Testimonial Fund, and addressed to the Treasurer, Fothergill Testimonial Fund, British Medical Association, B.M.A. House, Tavistock Square, London, W.C.1.

HOSPITALS IN CANADA

According to a bulletin issued by the High Commissioner, Canadian hospitals numbered 876 in 1933, and of these 606 were public hospitals, 238 were private, and 32 Dominion Government Hospitals. Of the 606 public hospitals, 457 were general public institutions, 34 tuberculosis, 36 Red Cross, 10 paediatric, 3 orthopaedic, 20 women's (only), 14 isolation, 6 convalescent, 23 incurable, and 3 special. The total bed capacity of all operating hospitals was 58,822 beds, of which total public hospitals had 53,544 beds, private hospitals 2,740 beds, and Dominion hospitals 2,538 beds. The number of hospitals with *x*-ray departments totalled 486; 229 had clinical laboratories; physiotherapy departments totalled 230; whilst 119 had out-patient departments, and 220 had approved schools of nursing, with a total of 8,044 nurses in training.

The forty-second annual edition for 1936 of the *South and East African Year-book and Guide* is published by the Union Castle Mail Steamship Company Limited at 2s. 6d. (postage extra). The contents have been carefully brought up to date and the volume now contains over 1,100 pages of text. The immense mass of information for readers of every kind includes articles on climate, both general and local, so embodied in the book as to aid the invalid in choosing the situation and occupation best adapted to his special needs. There is also a section on public health in the Union of South Africa.

Reports of Societies

GROWTH IN CHILDREN

At a meeting of the Section for the Study of Disease in Children (Royal Society of Medicine) on January 24th, with Sir LANCELOT BARRINGTON-WARD, president, in the chair, a short paper was read by Dr. E. P. POULTON and Dr. T. W. ADAMS on "Metabolism, General Nutrition, and Growth in Infancy and Childhood."

Dr. Poulton discussed the relation of the logarithms of the height and weight of children from birth up to adult age. He pointed out that there was an inflexion in the curve when the body weight reached 10 kg. (22 lb.) (approximately) at the age of from 10 months to 2 years; another when the body weight was about 18 kg. (39.5 lb.) at the age of 4 to 5 years; and a third when the body weight was from 50 to 55 kg. (110 to 120 lb.) at the age of about 15 years. The slowing down of the increase in weight between the ages of 1 and 4 years without a slowing down proportionately of the increase in height was explained as being due to a loss of fat when children began walking. A change in metabolism also occurred at about this period—that is, it remained about constant even though the weight increased. The alteration was explained by the disappearance of the luxus consumption associated with the fat of babyhood. The weight-age curve was not so regular and weight-age should not be looked on as a proper index of growth; the better index was height and age. On comparing classes of the community of different social status, it was found that while the height-weight curve was constant the height-age curve was variable. The explanation might be that all children had now enough food to eat as far as calorie value went, but the children of the lower social classes were less tall for their age—practically speaking, social status might be graded by this characteristic—possibly because of lack of vitamin A, and perhaps of D. He stressed the need for more reliable data on the physical measurements of children, also the desirability that they should be naked when weighed, a rule by no means invariably followed.

Dr. LEONARD FINDLAY said that, taking Baldwin's figures as a standard, private patients would generally be found to be well in advance of them so far as height was concerned, but not in respect of weights. There was a marked social difference between the rate of growth in height and the rate of growth in weight. During an investigation which Dr. Noel Paton and he had carried out in Glasgow on poverty in relation to nutrition and growth it was striking how marked relatively was the rate of growth during the first eighteen months of life; the moral they deduced was that it was on that period they must concentrate in order to get the best development.

Dr. ALAN MONCRIEFF referred to the absence of a compilation of English standards. In children's hospitals and wards tables and illustrations of heights and weights and age curves were in every instance based on American figures. Some years ago he collected the more or less official figures from different parts of the world, and found the differences between different countries and towns very marked. Yet the figures from a mixed population in America were taken and used as standards against which English children were measured. An anthropological survey of the English child was long overdue.

Dr. POULTON in reply said that the height-weight index was fallacious only because the same results were always forthcoming whatever class of the population was investigated. Height-weight was a good criterion to take for animals, but not a good one for children. Height and weight depended upon the calorie value of the food, but the growth factor might be a question of vitamin adequacy. What was really wanted in the case of children of the upper classes was not more calories but food of higher vitamin content. He agreed with Dr. Moncrieff that reliable observations of children from a statistical point of view were badly needed in this country.

THE SWAB IN DIPHTHERIA

A discussion on "The Use and Abuse of the Swab in Combating Diphtheria" took place in the Section of Epidemiology and State Medicine of the Royal Society of Medicine on January 24th. Surgeon Captain S. F. DUDLEY presided.

Dr. H. J. PARISH, after mentioning the remarkable diversity of opinion and practice with regard to the diagnosis of diphtheria which was revealed some eighteen months ago in the correspondence columns of the *British Medical Journal*, said that the responsibility for such diagnosis rested entirely with the clinician. The detection in the laboratory of organisms morphologically resembling the diphtheria bacillus did not prove the disease to be diphtheria, nor did their absence necessarily exclude it. The swab was, or should be, as a rule only confirmatory. The taking of a swab was a manipulation of major importance, and must not be delegated to a student or probationer nurse. An antiseptic gargle must not have been used for some hours previously. He went on to refer to the administrative value of the swab in the notification of cases, and mentioned various reports on collections of cases admitted to hospital as diphtheria in which a revision of diagnosis had to be made in 30 or 40 per cent. He pleaded for an "observation certificate," which, while sufficing for the removal of a patient from his surroundings, would obviate much administrative waste and prevent the rebuff which the practitioner experienced when his diagnosis was revised. The swab was also of value in the examination of contacts and carriers. The nose should be swabbed as well as the throat, as in many instances a nasal swab would give a positive result when a throat swab would not. The swab, again, was an aid to research, as, for example, in the case of diphtheria in Schick-negative reactors, the investigation of carrier rates and the effect of artificial immunization upon them, and the origin of natural antitoxin.

Laboratory Methods

It was necessary to consider in what respect some of the older methods of investigation had been found wanting, and what refinements of technique had been introduced of recent years or were now undergoing trial. Some laboratory workers believed that it was no longer safe to rely solely on Loeffler's serum, and some modification of laboratory technique in this respect might be desirable. He suggested a scheme consisting first of the examination of the direct smear, mainly to exclude Vincent's angina, and then either inoculation of the swab on a Loeffler's slope and McLeod's medium (the latter enabling the bacteriologist to report within twenty-four to forty-eight hours on the type of diphtheria bacillus), or inoculation on a Loeffler slope (preliminary report in eighteen hours), and, whether microscopically positive or negative, the overnight growth to be heavily subcultured on to Horgan and Marshall's tellurite medium, which was extremely easy to prepare. The next stages were fermentation and virulence tests, and then the final report. The advantages of tellurite media were: (1) more positive results (from 10 to 25 per cent. more positive results than with Loeffler's serum); (2) more or less complete inhibition of other organisms; (3) ready differentiation of colonies of diphtheria bacillus from those of Hoffmann's bacillus; (4) the giving (with McLeod's medium) of characteristic types of colony for the "gravis," "intermediate" and "mitis" strains. The serum-treated swab (Folger-Sole) improved the rapidity and reliability of diagnosis, and therefore merited consideration.

The special applications of the complete laboratory technique included administrative and research purposes, as in dealing with the difficulty of persistent carriers, and also as a further aid to diagnosis. Modern refinements were costly, but they were usually unnecessary in typical cases. If cases clinically typical were negative on Loeffler, tellurite was requisite. But the speaker stressed again that laboratory methods must not be employed as a primary or chief means of diagnosis. Diphtheria was a disease, not a bacteriological finding. Close collabora-

tion between bacteriologist and clinician was essential. It was on the physician that the onus of early diagnosis and treatment rested, and the physician should have some knowledge of the methods used by his bacteriological colleague.

Hospital Administration

Dr. C. O. STALLYBRASS dealt first with the question of the extent to which the swab was used before admission of a case to an isolation hospital, and whether such use was valuable, injurious, or indifferent. Two years ago a questionary was undertaken with regard to about 200 consecutive cases admitted to Liverpool hospitals. Of these, 175 were regarded in hospital as diphtheria. The fatal cases numbered fourteen. Information as to swabs taken outside was obtainable in only 133 of the cases, and of these a swab was taken before admission to hospital in only twenty-one (15 per cent.) The average delay in sending for the doctor was much greater in the fatal than in the non-fatal cases. The average in the whole series was thirty-six hours' delay; in the fatal cases it was sixty-five hours, and in the cases swabbed before admission only twenty-six hours. The average delay from the time the case was first seen by the doctor to the first dose of serum was 16.1 hours in the whole series, 35.4 hours in the fatal cases, and 19.7 hours in the cases swabbed outside. In five of the fourteen fatal cases the parents' delay in sending for the doctor was over forty-eight hours. The definitely high case mortality of the whole series was associated with the presence of the "gravis" type of organism. If this series was typical it must be concluded that the main factors in mortality were the prevalence of a severe type of infection, and failure on the part of parents or of the doctor to realize the gravity of the infection in young children; the time spent in taking a swab did not contribute to the fatal issue. The urgent need was for early and correct diagnosis, or alternatively an adequate dose of serum in children under 7 years of age suffering from sore throat or enlarged glands. The use of the swab was to be urged in all cases where doctors were in doubt, but at least in children under 7 years of age the patient should simultaneously be given the benefit of the doubt, and either have serum or be admitted to hospital as a suspect. In the series quoted only one of the cases swabbed was a nasal case, but he could not believe that only one out of 133 was a case of nasal diphtheria. If all cases of purulent nasal discharge were swabbed he prophesied that a much larger proportion of cases would be admitted.

The speaker next referred to the effect of the typing of strains upon hospital procedure. In Liverpool a severe outbreak occurred at the end of the war, and the fatality rate rose to 17.5 per cent. A fresh outbreak occurred in 1930 and continued. Last year an investigation pointed to the presence of a large proportion of the "gravis" type in Liverpool. A further survey of 108 consecutive admissions into hospital gave 37.2 per cent. "gravis," with two deaths; 45.8 per cent. "intermediate," with three deaths; and 17 per cent. "mitis," with no deaths. A series of patients had been followed through their stay in hospital, and it was found that the type not infrequently changed during the course of their stay—for example, from a non-virulent "mitis" to a non-virulent "intermediate," or from "intermediate" to a virulent "mitis." In view of these findings, which pointed clearly to cross-infection, ideas of hospital administration might have to be revised. As for abuse of the swab, this lay mainly in allowing the bacterial finding to warp the judgement.

Clinical Aspects of the Question

Dr. J. D. ROLLESTON said that he was fully in accord with the remarks of the two previous speakers not only in regard to collaboration between the physician and the bacteriologist, but also as to the onus of the diagnosis resting primarily on the clinician. This was a point of extreme practical importance and constantly emphasized viva voce as well as in textbooks and literature, but nevertheless it still frequently happened that delay occurred in giving the patient antitoxin or sending him to the fever hospital because the report of the throat swab had not been received or was negative. A mistaken diagnosis of quinsy led not only to an error of omission but of commission, because an incision might be made, with serious results. Such errors were specially liable to be made by recently qualified hospital residents, but they might also be committed by general practitioners of some years' standing. Dr. Rolleston proceeded to discuss cases in which it was not necessary to give the antitoxin before the bacteriological report was received. In the case of purely nasal, ocular, aural, and cutaneous forms of diphtheria, each of which tended to assume a mild and chronic course, the bacteriological report might be awaited before antitoxin was given. The direct smear had only a limited value. The proportion of positive results varied considerably with different observers. A negative result was of course quite inconclusive, though he would not, like some French observers, advocate giving up the direct film altogether. It was of value in showing the predominance of certain organisms—staphylococcal, streptococcal, or pneumococcal—but it should be used only in cases of suspected faucial diphtheria. With regard to cultures, there was at present a much greater tendency than formerly not to send patients to hospital with a certificate of diphtheria until a positive culture had been obtained. In support of this practice it might be urged that it prevented notification and disinfection being unnecessarily carried out, or the patient being taken from his home. On the other hand, the disadvantage of waiting for a report before making at least a provisional diagnosis and injecting antitoxin and sending the patient to the fever hospital considerably outweighed its advantages. A negative result might be due to the struggling of the child, to taking the swab too soon after food or the application of an antiseptic, or to inexperience on the part of the examiner. To rely on a single negative culture was dangerous. Marshall and Guthrie had mentioned that out of 549 cultures which were negative when first examined fifty-two were positive on fresh incubation after twenty-four hours. In the case of isolated nasal diphtheria, which only in the minority of cases assumed a membranous form, not only must the culture be taken to establish the diagnosis but the virulence of the organism must be tested. The same remarks applied to suspected diphtheria of the conjunctiva and the middle ear. In the dermatological field, diphtheria, like syphilis, was a great imitator. During the war a large number of wounds, especially with the army in Germany and in the Egyptian Expeditionary Force, were found to be infected with diphtheria bacilli. The commonest form of diphtheritic skin lesion in his experience was the whitlow. It was advisable in cases of whitlow which did not yield to treatment to have an examination for the organism. Should all sore throats be swabbed? Dr. Rolleston discussed cases in which this was not necessary, including scarlet fever in the eruptive stage or surgical scarlet fever following tonsillectomy, or syphilitic sore throat due to the presence of a primary chancre, though a swab here might sometimes be required in view of the possible coexistence of diphtheria and syphilis. Considering the well-known intermittency of the carrier state, he was very sceptical as to the scientific value of terminal swabs before the patient was discharged from hospital, though the procedure had a certain forensic value as showing that precautions had been taken before discharging the patient.

Abuses of the Swab

The PRESIDENT (Surgeon Captain Dudley) called attention to what he called a "psychological" abuse of the swab. Anybody who had had experience of work in diphtheria was aware that if there were not such a thing as a swab many general practitioners would treat their cases with antitoxin at once. He agreed with Dr. Rolleston as to the dangers of relying on a single negative culture.

One curious feature of the carrier condition was its intermittency. He mentioned the case of a carrier who was swabbed every day for about seventy days, and he would run five days positive, three days negative, and so on. If one wanted to have a terminal test it would be much better, instead of accepting three negative swabs at weekly intervals, to require seven consecutive negative swabs in a week.

Dr. G. W. J. BOUSFIELD mentioned that many general practitioners, especially in poorer districts, were very much opposed to giving antitoxin to a patient without some proof to be furnished to the relatives that it was necessary. What the practitioner wanted was a rapid answer to his question. He wanted to know within twelve hours. It was questionable how far Dr. Parish's more complicated methods were applicable in primary diphtheria. If the bacteriologist got a negative swab he was a wise man to tell the practitioner, whatever the result with the swab, that should the case look like diphtheria he should treat it or send it somewhere where it would be treated. He thought the profuse carrier was usually found with Loeffler's medium, and if a search was to be made for all the sparse carriers he was not at all sure that much damage might not be done. Nature had a process of its own at work. He had noticed a definite tendency for the Schick test to become less positive than it was ten years ago, and he thought they ought to be careful before they chased all the sparse carriers, because Nature's balance might be upset, and the process of natural immunization, which was after all a very important one in keeping the community free from the disease, be interrupted.

Dr. E. A. UNDERWOOD registered a mild protest against the continued inclusion in textbooks of the statement that wherever the practitioner felt it necessary to take a swab he ought to give antitoxin. That dictum was propounded first by Ker, but Ker was a supreme physician in the infectious diseases field, and when he found it necessary to take a swab no doubt he had considered the various other diseases which might come into the differential diagnosis. Some time ago in the area in which the speaker was concerned he elicited that out of about 1,300 throat swabs sent for examination under 7 per cent. were positive, and of nasal swabs roughly 12 per cent. These figures suggested some slight abuse of swabbing, but they also suggested that if Ker's dictum had been followed a great number of children and adults would have received antitoxin unnecessarily.

Dr. E. W. GOODALL said that while contacts were swabbed, he had never heard that fever hospital staffs were periodically swabbed. To be strictly logical, they ought to be, and two or three times a week! Again, with regard to the skin lesions—whitlows, impetigo, and so on—he had never seen any cases reported which had given rise to other cases of diphtheria. Were they dangerous?

Dr. R. A. O'BRIEN referred to the remark of Dr. Stallybrass about infection with different types of diphtheria bacilli while the patient was in hospital. McLeod had described how in Leeds a rapid diagnosis was made, and "gravis" diphtheria sent to a "gravis" ward and "mitis" to a "mitis" ward, with the result that the cases remained true to type. The deduction was that in the ordinary hospital there was constant cross-infection.

Dr. G. CLARK TROTTER said that some practitioners, because there had been a diphtheria case in a household, immediately swabbed the other members of the family, though they had nothing obviously wrong with them. If a mother were swabbed just after she had been attending a diphtheritic child she would give a positive result, whereas if one waited until the next day or the day following it would be negative. Yet on the strength of the positive result she was sent to hospital, and after a day or two sent back again, to the discredit of the practitioner. With regard to diphtheria outbreaks in scarlet fever wards, there was a danger in that respect, which he had overcome by giving every scarlet fever patient admitted a prophylactic dose of diphtheria antitoxin.

CHRONIC ARTHRITIS

At a pathological meeting of the Liverpool Medical Institution on January 16th Dr. DOUGLAS H. COLLINS read a paper on recent work on rheumatism.

Dr. Collins distinguished two main and distinct pathological types of chronic arthritis. The rheumatoid type was essentially an inflammation of the joints; multiple joint lesions were the rule, and systemic evidence of infection might be found. The osteo-arthritic type was essentially a degenerative lesion, often associated with compensatory hypertrophy. Injury, either single or repeated, was important in the aetiology of some cases, and in others the osteo-arthritis (for example, of the hip) arose from no known cause. Cyst-like areas of rarefaction appeared in the bones around the affected joints in the idiopathic cases, but were not found in any other form of arthritis Lesions of the osteo-arthritic type were also met with as secondary phenomena in joints in the late stages of rheumatoid arthritis, in haemophilic and scorbutic joints, and in the Charcot joint, but those conditions had special features, and should not be included in the category of osteo-arthritis. The significant pathology of some of the groups of the rheumatoid type of arthritis was then discussed. The speaker said that gonococcal arthritis was a blood-borne metastatic infection from a primary focus, and that there was no evidence that any method other than actual invasion of the joint by the gonococcus was involved. The complement-fixation test with gonococcal antigen and the patient's serum or joint fluid might be useful in diagnosis. Syphilitic arthritis, which had the pathological features peculiar to syphilis elsewhere, was uncommon; diagnosis was most often achieved by observing the response to anti-syphilitic therapy. The general nature of the pathological changes in tuberculous arthritis brought it into line with other examples of the rheumatoid type, but it was characterized by the specific histology of tuberculosis. Chronic gout often resembled the rheumatoid type of arthritis, though characterized by ureatic deposits and disturbance of the uric acid metabolism. Arthritis secondary to focal infection was not very common. With recovery from, or removal of, the primary focus the joints returned to normal, or recovered with the aid of salicylates and a little mild physical therapy. The pathological grounds for distinguishing "chronic infective polyarthritis" from "primary rheumatoid arthritis" were slender. The arguments against the general application of the focal infection theory of origin to rheumatoid arthritis were summarized, and the use of the word "allergy" in connexion with rheumatoid arthritis was discussed. It was probably correct to assume a positive allergic factor —sensitization rather than desensitization of tissues—in that as in any other chronic disease. Any form of allergy implied the primary and continued exhibition of some "toxin," and this "toxin" had yet to be identified before the word allergy could honestly be used with any meaning. Typical rheumatoid arthritis was believed to be a clinical and pathological entity; in other words, a specific disease, the nature of which was unknown. No one clinical sign was peculiar to the condition, but collectively they formed a typical syndrome. The local pathology differed only in detail from other forms of the rheumatoid type of arthritis which were due to specific infections. General evidence of infection was always present. Although ignorance of its aetiology must be admitted, pathological researches considered together with clinical observations served to define the disease of true rheumatoid arthritis, and that constituted the first step towards solution of the problem.

Dr. H. J. BERESFORD-KNOX stated that he had for the last twenty years treated numerous cases of rheumatoid arthritis varying in severity, and had been successful in making the almost hopelessly crippled patients use their joints and take active exercise without sticks or crutches. In a great number of cases *B. coli* was found in the urine; after treating a patient with this condition by a vaccine it was observed that the condition of the joints improved considerably.

PITUITARY DISEASES

The meeting of the Midland Medical Society on January 8th was devoted to the subject of the pituitary gland and its diseases. Professor W. H. WYNN was in the chair.

The PRESIDENT surveyed the historical aspect and present knowledge about the gland, which, on account of its peculiar intracranial position, had given rise to much speculation in the past. He said that it had derived its name from its supposed association with the nasal secretions, and it was later believed to be concerned with the formation of the cerebro-spinal fluid. Its association with general metabolism had been first adequately described by Marie in his famous monograph on acromegaly, which pointed out the direct connexion of the disease with enlargement of the gland. The president commented on the series of experiments on various extracts and the many attempts to discover the special functions of the gland, referring to the pharmacological uses of pituitrin. He remarked that many hormones had been described as being elaborated in the gland, which had been termed the master organ controlling the orchestral harmony of the other members of the endocrine system. Its secretion had a marked influence on growth and sexual development. A brief review of the embryology of the gland was given, and attention was drawn to the essential cellular elements—basophil, eosinophil, and chromophobe cells in the anterior lobe—to each of which separate functions had been attributed. The anatomical and physiological relationships of the posterior lobe and of the base of the brain were outlined. The president added that it was not always easy to correlate exactly the structural changes in the pituitary gland with the various syndromes believed to be due to disturbance of the normal pituitary function.

Illustrative Cases

Professor WILKINSON showed a case of acromegaly in a man, aged 38 years, who possessed all the classical features of the disease.

Although this patient had complained of headaches and had marked *x*-ray signs of enlargement of the sella, there were no subjective or objective visual disturbances. Samuel Wilks, in 1869, had originally mentioned the disease, but Marie, in 1886, was the first to disclose its relation to pituitary gland enlargement.

Professor PARSONS showed a case of progeria in a child aged 11, who weighed only 26 lb.

He was bald, and the skin was thin. The fontanelle was open; the joints were thickened, and movements were limited. He had a senile appearance, with a thin, piping voice, and there were no signs of sexual maturity. He showed the antithesis of acromegaly. The systolic blood pressure was 115, and arteriosclerosis was present. The disease was essentially due to atrophy of all the elements in the anterior pituitary lobe, and the suprarenal glands were also atrophic. The disease was first named in 1897 by Gilford, who recognized the combination of infantilism and senilism. The patients never exceeded 3 feet in height. It was proposed to treat the boy with antuitrin injections.

Professor Parsons also showed three cases of the Lorain type of infantilism.

Two were brothers. All had good mental powers, and were well developed except for smallness of stature and lack of sexual development. One patient, a girl, had been treated by pituitary tablets by mouth without success, but injection of antuitrin "S," and later of antuitrin "G," had resulted in remarkable improvement. She had grown 2½ inches in height, and had gained several pounds in weight during the past four months. She could now also walk and talk. Antuitrin "G" was a recent hormonic extract, derived essentially from the eosinophil cells of the anterior lobe.

Dr. A. P. THOMSON showed a case of pituitary basophilism treated by deep *x*-ray exposures to the gland.

The patient was the eldest of a family of four. In 1923, when aged 18, she weighed 13½ stone; weight increased in six months to 16 stone. There were severe persistent headaches. Hair grew on the face and legs; she shaved every day. Menstruation had been scanty and irregular, and she had amenorrhoea for several months when aged 22. She had curious attacks of loss of power, without giddiness or loss of consciousness. Genital pruritus had been a persistently troublesome symptom. She had occasionally curious temporary swellings on the body, and in 1923 suffered from renal calculi; she now had stones in both kidneys, and one in one ureter. There was considerable obesity of the trunk, arms, and thighs; she had a florid face, lineae atrophicae, slight polycythaemia, and a blood pressure of 200. Various lines of treatment had been tried. In 1929 thyroid extract and diet reduced her weight to 13 stone, but pituitary extract had no effect. In 1933 theelin, in doses of 100 units a week, was tried for six months, but gave negative results. In 1934 deep *x*-ray applications to the pituitary gland over a period of one month caused some improvement, especially in the hirsuties. Intense headache had occurred during the period of treatment, but it had disappeared and had not recurred. The hairiness was much less, and the blood pressure had fallen to normal, but the obesity persisted. The blood count was normal, and the pelvic organs showed no abnormalities.

Dr. GILBERT HALL also showed a case of pituitary basophilism treated by deep *x* rays.

The patient, a woman aged 27, had obesity, facial hirsuties, mental apathy, and depression. She developed generalized eczema. The menses had begun at 13, but had been irregular; there had been a period of amenorrhoea lasting nine months five years ago, and later continuous amenorrhoea. She always had polydipsia, and bi-frontal headaches occurred every three weeks. There was a ruddy facies, and some hypostatic oedema of the legs. Acrocyanosis and ecchymosis, glycosuria, and hyperglycaemia were present. The blood pressure was 184/110. The sella was normal, and the blood showed polycythaemia. Treatment by deep *x*-rays had so far produced improvement in the hirsuties condition, the headaches, and the general vigour.

Mr. F. A. R. STAMMERS showed a case of chromophobe tumour of the pituitary gland, the commonest type of pituitary tumour.

A man, aged 32, for three years had noticed failing vision in the right eye, and during the first six months he suffered occasionally from severe headaches. An examination revealed primary optic atrophy in the right eye and almost three-quarters loss of visual field, the nasal quarter being present only. A slight increase in subcutaneous fat was associated with a smooth skin and hypotrichosis. An *x*-ray examination showed sella changes. The patient felt well in himself, and at first refused operation, but the visual fields were tested at short intervals, and the right eye became gradually worse, so he consented to operation. The tumour was removed by the usual transfrontal route, and the vision had improved since.

Remarks were made by Mr. Stammers on the desirability of patients who complained of loss in vision being examined by an ophthalmologist as opposed to an optician. Careful examination of the visual fields, preferably by Bjerrum's screen, was very important if cases of chiasmal compression were to be detected in a relatively early stage. Mr. BEATSON HIRD discussed the types of chiasmal compression seen in pituitary tumours. Field defects could often localize the lesion, and frequently gave a hint as to the type of lesion present.

The PRESIDENT added some observations on pituitary basophilia. The pituitary adenoma in some cases was very small, and the essential pathology seemed as yet to be uncertain. There was a remarkable association in some cases with cortical suprarenal enlargement. He had also noted with special interest the value of antuitrin "G" in the treatment of pituitary infantilism.

The ninth annual meeting of Ulaws (the University of London Animal Welfare Society) deals principally with the Gin Traps (Prohibition) Bill, sponsored by the society. Unfortunately this Bill was defeated by a narrow margin in the House of Lords, but the society, undeterred by the heavy expense involved, hopes to introduce it again this year. The society has also done excellent work in making known as widely as possible the humane method of rabbit control by cyanide fumigation, which is successfully employed in Australia. These are only two of the many beneficent activities of Ulaws, which collaborates widely with similar societies at home and abroad.

India

The Punjab Leprosy Campaign

The triennial report on the working of hospitals and dispensaries in the Punjab for the years 1932–4 inclusive draws attention to the increasing seriousness of the leprosy problem. Colonel C. H. Reinhold, I.M.S., Inspector-General of Civil Hospitals, refers to the intensive surveys which have been made under the auspices of the Punjab branch of the British Empire Leprosy Relief Association, and states that there are signs of considerable awakening among the public as to the peril of this disease, and of increased interest in the measures being taken to eradicate it. The benefits of continued treatment are also now better appreciated than formerly. There are five leper homes in the Punjab managed by missionary societies and under the care of fully trained medical officers. Instructions have been issued that in future infectious cases should be admitted in preference to "burnt out" cases, in order that a greater number of persons may be treated effectively. The Government makes a substantial grant towards the maintenance of leper homes on a *per caput* basis for a fixed number of inmates in each home, and extra grants are available for patients who are undergoing special treatment. At the end of the triennial period reviewed, the American Presbyterian Mission at Ambala had to resign its control over the home there, which accommodates eighty adult patients, owing to inability to provide a medical officer. The closing of this institution was averted by the British Empire Leprosy Relief Association, which assumed responsibility for its management. The five homes in the province have accommodation jointly for 640 adults and 180 children. A fairly large number of the inmates come from distant parts of India, particularly from the North-West Frontier Province, which consequently makes a financial grant towards their support. Outdoor leprosy clinics have been established also at various centres. Many practitioners have received special instruction locally, and medical students have been given courses of lectures in the latest methods of diagnosis and treatment of the disease.

Opium Eating

A report emanating from the Drug Addiction Inquiry instituted by the Indian Research Fund Association was published in the October issue of the *Indian Journal of Medical Research*. It deals with the opium habit in India, and comprises studies of its physical and mental effects which have been pursued by Lieut.-Colonel R. N. Chopra and Captain G. S. Chopra from the School of Tropical Medicine in Calcutta. This would appear to be the first systematic and detailed investigation of the subject, and it has taken several years to complete, the number of cases studied being over 1,500. The observations here recorded deal only with opium eating. The authors state that the habitual eating of opium in small quantities may not produce any marked physical or mental degeneration; addicts may keep fit, gain weight, and continue their ordinary work for many years. With large doses, however, the gastro-intestinal tract becomes seriously disturbed; obstinate constipation alternates with diarrhoea, and there is loss of appetite. There are indications of toxaemia, with loss of weight, anaemia, a sallow colour, and even signs of cachexia. The biochemical changes are mainly concerned with the general metabolism and blood sugar. An increase in the albumin and euglobulin fractions has been shown to be responsible for many of the nervous and physical symptoms frequently found in opium addicts. There is also an increase in cholesterol, and a diminution of the lecithin content of the blood. The opium habit was found to be more liable to injure the mental and moral abilities of persons who had a nervous diathesis. The common mental changes observed were: the development of lazy habits, impairment of memory, slow cerebration, lack of self-confidence, selfishness, and irritability of temper. The popular belief that opium addiction is to be found only among degenerates and vicious weaklings does not, apparently, hold good for Indian addicts. The habit of eating opium has no direct relation with crime, and is not considered socially objectionable in India, provided that excessive doses are not taken; opium smoking, however, is universally condemned. The authors find reason to believe that the opium habit tends to inhibit impulses of a violent nature by lowering the vitality and reducing ambition and courage, thus diminishing the tendency to give way to criminal impulses. When taken in large doses for long periods opium does not lead to insanity, but it seriously injures the physical and mental faculties. It was found that the percentage of women who take opium was very small, and that it was only used by them for the relief of pain or for similar definite reasons. The average daily dose in the authors' series worked out at 10 grains, as compared with 13 grains per head per day in their series collected in 1928.

Ireland

Public Health in the Irish Free State

The annual report of the Department of Local Government and Public Health in the Irish Free State for 1933–4 records a substantial decrease in the numbers of deaths from all causes, the total death rate of 13.54 per 1,000 of the population being the lowest yet reached in that country. The lowest subsidiary death rates occurred in Counties Roscommon, Kerry, Mayo, Clare, Galway, Donegal, and Sliga, all situated on the western seaboard with the exception of Roscommon, and from an economic point of view not among the most prosperous parts of the country. For the tenth successive year no case of small-pox occurred; this immunity appears to be due to the effectiveness of the prophylactic measures and the co-operation of the community. Typhus fever, which has hitherto been regarded as endemic in the poorer districts on the Atlantic seaboard, showed a marked decline in incidence during 1933, when only twelve cases were notified, and these were confined to three families. Thirty cases were notified in 1932, and it now seems that the efforts of the anti-typhus campaign are beginning to bear fruit. A study of the morbidity statistics of recent years indicates that this disease is being abolished by the steady advance in urban housing and general sanitation. Typhoid fever was also less prevalent, the reduction, as in the case of typhus, being most marked in the urban districts. In common with the rest of Europe, there was an increase in the incidence of diphtheria during the twelve months under review. The death rate from this cause, of 14 per 100,000 of the population, is the highest since 1921, and in view of the mortality rate in Dublin City the municipal authorities have been endeavouring to bring home to the population the necessity for immunizing children under the age of 12. The immunization campaign in Southern Ireland started in 1928, and the statistics from various parts of the country have revealed its value; the present regression was not unexpected, since there had been an increased apathy in the population generally following the first substantial successes. In 1933 there was a decline in the incidence of scarlet fever, although the number of notifications is still regarded as too high. The number of poliomyelitis cases slightly increased; this disease, however, is not everywhere notifiable. The maternal mortality rate seems to be decreasing, but the incidence of puerperal sepsis is still too high, especially in rural districts. The hospital system is being reorganized to provide beds for the treatment of cases of difficult labour and for gynaecological patients. A gratifying indication of improved sanitary conditions affecting infant life is afforded by the registration returns, which show the infant death rate for 1933 as 65 per 1,000, the lowest yet recorded. Approved maternity and child welfare schemes are now functioning in the four county boroughs of Cork, Dublin, Limerick, and Waterford, in the boroughs of Clonmel, Dun Laoghaire, and Wexford, in

fifteen urban districts, and in three county health districts. There was further progress in the campaign against tuberculosis, and Longford County is now the only area in which satisfactory arrangements for combating the disease have not yet been made. For early cases of tuberculosis there are now 1,088 beds in sanatoria, representing a proportion of one bed for each 2,751 of the estimated population.

CORRESPONDENCE

Relative Frequency of Certain Diseases

SIR,—Dr. Twiston Davies's note in your issue of January 18th (p. 111) is of interest and value. It has often been apparent to me that as teachers we fail signally in being unable to state the approximate frequency of diseases as they are found in the population, rather than as they appear in hospital and in the private practice of specialists. Our teaching should be founded on what the students will require later on. So often a rare condition is shown to them without their being told that they are unlikely to see such a case again. As the student mind often resembles that of the collector, and rarities seem of value to it, the total loss of receptive surface by its occupation with such things is a serious one in later life. One may argue that they will fail to recognize the rarity if they have not seen it. In that case they will take another opinion. For research into the cause of a condition the rarity is vastly important.

Until we realize that the curriculum is so overcrowded with useless matter that the only solution is to divide the profession—which is obliged to conform to it—into officers, N.C.O.s, and men, and plan for a ranker to become an officer in due time if he wishes to do so, and meanwhile omit all irrelevant matter, we shall continue to waste much of the country's brain power. Had the electrical engineering profession not realized this need some forty years ago and adapted their curriculum to it we should not now hold the supremacy that we do in such matters.—I am, etc.,

London, W.1, Jan. 24th. G. H. COLT.

X Rays in Obstetrics

SIR,—In the *Journal* for January 25th an account of the combined Sections of Radiology and Obstetrics of the Royal Society of Medicine is reported, the subject for discussion being "The Use of *X* Rays in Obstetrics." While bowing to the eminent opinions therein expressed as to the desirability of having the pelves of all primigravidae measured by *x* rays, with (or without) cephalometry of the foetal skull, I beg to make the following assertions, which, in the light of a wide experience, seem to me to be incontrovertible.

1. If the *bare* foetal head is equal to or greater than the diameters of the pelvis to be encountered in the last four weeks of pregnancy, then, while the head is still encompassed by the uterine wall, it will appear so grossly disproportionate to the pelvis as to enter the category of "absolute disproportion," and the appropriate treatment will be section.

2. If the size of the foetal skull is less than the pelvic diameters to be encountered, yet the head is "high," no estimate, save a trial of labour, can possibly decide the eventual issue, since labour alone can remove the "doubt-raising element"—the cervical tissues.

3. Whatever examination, radiological or clinical, is made, the normality of the uterine action remains to be proved or disproved in each case. If uterine action is strictly normal some heads, even in the first assertion, will get through with severe moulding and soft-part trauma. Cerebral lesions and asphyxia will take an infant toll.

If the uterine action is *not* normal—that is, tends to spasm in place of polarity—then all the measurements and examinations fall to the ground. The obstetrician, armed with the measurements of the radiologist, is inclined to focus his attention on these, and simply ask the sister, "Is the patient having any pains?" The only sane exit from this state of mind is to section the cases in paragraph 1, and in paragraphs 2 and 3 secure normality of labour by the judicious use of morphine. The *x*-ray report can then be attached to the patient's record by way of completeness.—I am, etc.,

WENTWORTH TAYLOR,
Obstetrician and Gynaecologist to Dudley Road Hospital.

Birmingham, Jan. 26th.

Maternity Emergency Service

SIR,—With reference to the letter of Professor E. Farquhar Murray in your issue of the *British Medical Journal* (January 18th, p. 130), I am of the opinion that the home treatment of haemorrhage, shock, and eclampsia should be part of a maternity hospital service. The removal of a patient to new surroundings creates a degree of apprehension in the patient's mind in an ordinary case, while if the patient is badly shocked or exhausted the condition is intensified and aggravated by removal in an ambulance from the home.

At the County Maternity Hospital, Bellshill, severe cases are dealt with by the hospital emergency staff, comprising two doctors and two nurses, the team going out in a motor car, having on board a complete outfit for the carrying out of a blood transfusion or an intravenous saline, or for treating eclampsia, or delivering a failed instrumental case where a degree of shock exists. A nurse is left with the patient after emergency treatment has been carried out. Incidentally, twenty-five universal blood donors are registered and on call, so that where the necessity for a blood transfusion arises the donor can be brought with the minimum of delay.

During the year 1935 thirty-five cases were dealt with by the emergency staff, and only one patient died, while during the past four years since this work was first carried out the hospital death rate has been reduced by 50 per cent.—I am, etc.,

Bellshill, Lanark, Jan. 20th. H. J. THOMSON.

Fire-walking

SIR,—Sir James Purves-Stewart has written a letter of some length, which you have published, supporting his explanation of the fire-walking performance which we witnessed in Fiji, and I trust you will allow me to make some comments upon it.

He mentions, in the first place, some observations made in England in September on fire-walking performances by a Kashmiri Indian, Kuda Bux, witnessed by a number of persons whose names he mentions, and he states that these independent observations "strongly corroborate" his view "that the phenomena are induced by the influence of suggestion in an atmosphere of emotion and religious exaltation." I have not been able to discover where Sir James finds this corroboration, for the statements by witnesses which have been published are directly opposed to it.

Two such statements have been published, one by Mr. Harry Price, the secretary of the University of London Council for Psychical Research, who was responsible for arranging Kuda Bux's performance.

After describing the details of the performance, and in summing up the conclusions to be drawn, he writes:

"We proved that—in the case of Kuda Bux—fasting is not necessary, and that he does not have to work himself up into an exalted or ecstatic condition: he was so unconcerned that he might have been walking across the room."

Having excluded exaltation or ecstasy as a possible explanation, Mr. Price considers that three possible alternatives are left: one that it is done by "faith," and the others that the callosity of the skin, and a knack in placing the feet, coupled with a fairly thick epidermis, afford the solution. I may at once say that the two latter alternatives are in my view the explanation of the Fijian performance.

On the question of "faith" as an element in the performance, Sir Leonard Hill has written: "There is no evidence that the fire-walking feat of Kuda Bux had to do with faith other than the fact that confidence prevented sweating, and kept the soles of the walker's feet dry."

The second published statement is from Professor C. R. Darling, who was present at Kuda Bux's performance, and made careful and precise observations and measurements of its details. His statement is: "The feat was merely another form of the fireside experiment of picking up a hot cinder and returning it to the fire, when the fingers are not burnt if the action is performed quickly." He concludes: "The explanation of fire-walking is so obvious that this" (making another special instrument) "would be superfluous." He also says: "Fire-walking is a gymnastic feat, and the agile way Kuda Bux walked across the fire compelled our admiration, and would be difficult to imitate without much training."

There is nothing here in support of a theory of "suggestion."—I am, etc.,

Bute Medical School, The University, St. Andrews, Jan. 21st. DAVID WATERSTON.

Pathogenic Aerobic Actinomyces

SIR,—In your issue of January 18th (p. 116) there is an annotation on these organisms in which you ask what their generic status is. This question was answered fairly satisfactorily at the end of last century (Gedoelst: *Les Champignons Parasites*, 1902, p. 155). Bodin even offered evidence that such forms might arise from microsporon (ibid., p. 112). I am aware that such organisms are loosely referred to as lying on the borderline between the true fungi and the bacteria. In a letter to the *Journal* in January, 1921, I tried to hasten the funeral of this ridiculous statement. This, and the incorrect use of the term "spore," lies at the root of the pleomorphic nomenclature. For instance, Örskov starts his definition of Group I in these words: "Sporogenous fungi, etc."

Now I agree that they are like nothing else on land or sea except fungi, but they are undoubtedly asporogenous. In missing this point, that they are fungi imperfecti and therefore almost certainly asporogenous ascomycetes, he fails to find that he has reached charted seas. Surely it is not because they think the tubercle bacillus a bacillus that they never use spore in describing it!—I am, etc.,

London, W.13, Jan. 26th. ROBERT CRAIK, M.D.

Use of Basal Anaesthetics

SIR,—For some time past there has been considerable discussion on the use of nembutal. As the following has been an original investigation on my part, it may be of interest to some of your readers.

In the past nembutal has been administered either intravenously or orally. For children the oral route has been the method of choice, as the suitable vein in a child's arm or leg is often difficult to find, and children are also apt to object to a needle. In a large number of cases nembutal given by mouth has been a great success, but there have been cases where the child has not even been partially asleep after a dose of 1½ grains. This has been due either to the fact that the child has had something to eat immediately before administration of the drug or that it has had too much acid in its stomach, and any effect the nembutal might have had was consequently neutralized. The oral dose is usually:

1/2 grain from 1–2 years	1½ grains from 3–7 years
1 „ „ 2–3 „	2 grains „ 7–10 „

This is given forty-five minutes before the operation. A further half-grain is given if the patient is not asleep in thirty minutes. Several users, however, only give 1½ grains from the age of 5 to 12 years. It was found by experiments on animals that a certain amount of this barbiturate was absorbed when given per rectum, and it was decided to try nembutal suppositories for children. Naturally great care was taken, and only half a grain was administered as an initial dose. In very young children this produced only a mild sleep, and did not prevent them from waking up during the transit from bed to the anaesthetic room. The dose was therefore increased to 1½ to 2 grains, and during the course of the last few months, where the drug has been administered for the removal of tonsils and adenoids, a grain suppository the night before the operation and 2 grains in the morning has proved successful, and the children have been completely unaware of having been moved out of bed. The length of time that these suppositories take to act ranges from two to four hours.

The dosage that has been determined up to now is as follows (excluding children of 1 year, 1 grain per year):

1 grain from 1–2 years	4 grains from 4–5 years
2 grains „ 2–3 „	5 „ „ 5–6 „
3 „ „ 3–4 „	6 „ „ 6–8 „

After the age of 8 years the drug may be given orally.

As the majority of children have their temperatures taken per rectum, the suppository is inserted with the removal of the thermometer both in the evening and in the morning. If the child is to be operated on in the afternoon or late in the morning the suppository should be given at least three hours before the operation, so that when atropine 1/100 grain is injected half an hour before the operation the child is sufficiently sleepy not to notice the prick of the needle.

It is still too early to decide upon the exact dosage and time for this new method of using nembutal, but as it has been used with such success in nearly two hundred cases it is well worth a trial. There have been no unpleasant after-effects, and the only thing of note is that where the dose has been insufficient the child has sometimes awakened on the administration of gas and oxygen or ethyl chloride. On later inquiries, however, no memory of this was retained. In no case where the drug has been administered per rectum has there been complete failure, such as has been known to happen when the oral route is employed.

Nembutal has proved successful also in an outbreak of whooping-cough. It was decided to try the 1-grain suppositories to see if these would prevent coughing during the night, and in half a dozen cases the children had a perfect night's rest, with complete relief from coughing. It has also been used with a certain amount of success in the case of very restless children, but the doses in all these cases have erred on the small side. As experience is gained larger doses may be given.—I am, etc.,

London, W.1, Jan. 22nd. RONALD JARMAN.

SIR,—May I be permitted to offer a note of warning upon the after-treatment of patients who have undergone anaesthesia by avertin.

A patient of my own, a middle-aged lady, was admitted to a London nursing home on Wednesday afternoon; avertin was administered at 5.30 p.m. for the purpose of removal of seven upper teeth and immediate replacement by a temporary set. During Thursday she was given two large doses of Epsom salts and thoroughly scoured. On Friday she was

discharged from the nursing home and allowed to return to her own house, situated over 100 miles from London. I was asked to see her on Saturday, and found her very much distressed by tenesmus, faint, giddy, and rather shocked.

In my own practice I keep avertin anaesthesia for major operations, after which patients are kept in bed for at least ten days, during which the drug is excreted completely, and no ill effects have resulted. It would appear to be unwise to use a drug of this type for a minor surgical procedure in which perfectly adequate anaesthesia may be obtained by evipan.—I am, etc.,

Sherborne, Jan. 25th. JOHN WHITTINGDALE, F.R.C.S.

The Age Problem in Prostatectomy

SIR,—The following note appeared in a local paper in August, 1935, and seems to merit some amplification:

"Mr. ——, who has recently recovered from a very serious illness, indulged in a high dive at the marine lake twice this week. He is a most marvellous man for his age, and his courage and vitality put many a young man in the shade."

The patient in question, a man aged 72, conducts a large retail business. He has always been a very active man. He swims, dives, plays bowls, and is a member of several local committees. In May, 1934, he complained of frequency, occurring especially at night, with some scalding and a poor stream. He was advised operation, but preferred to try palliative treatment first. Under routine treatment with fluids, alkalis, and rest in bed his general condition improved gradually, and he was only seen occasionally during the next few months. In August he had to be catheterized on one occasion. Finally he consented to operation, and was admitted to hospital on September 7th, 1934.

His residual urine was two ounces, his blood urea was 35 mg., and a urea concentration test was as follows: 7 a.m., 160 c.cm., urea, 1.7 per cent.; 8 a.m., 75 c.cm., 2.7 per cent.; 9 a.m., 60 c.cm., 3.1 per cent. An examination of the urine showed a trace of albumin, and the reaction was faintly acid. In the centrifuged deposit there were a few pus cells, which showed some *B. coli*; there were no casts and no red cells. B.P. 155/90 mm. Hg.

On September 15th prostatectomy was undertaken under spinal anaesthesia. A large adenomatous prostate was removed suprapubically. The operation did not seem to upset the patient unduly, and he remained well for a few days after, until he was found to have some oozing from the prostatic bed. This increased steadily, until finally he collapsed. A blood transfusion was given, and his convalescence while in hospital was uninterrupted thereafter. He was discharged on October 31st.

On November 2nd he developed a small pulmonary embolus in the right upper lobe, which was followed a few days later by a severe thrombophlebitis of the left internal saphenous vein. There was considerable oedema of the leg, and marked pain, which subsided gradually, so that at the end of December he was allowed downstairs for the first time. At the end of February, 1935, he was in bed again for five days with a slight recurrence of phlebitis. After this had subsided an elastoplast bandage was applied to the leg, and he was allowed to walk. He remained under supervision at home until early in March, after which he was only seen two or three times during the next month. He began attending to his business again, and for the last eight months has had quite normal control of micturition. He continued his diving and swimming until well into September.

The high dive mentioned is twelve feet from the level of the lake, the temperature of which has at no time been warm enough to attract any but enthusiasts. Such feats may perhaps be regarded as tempting Providence, but one must admire a patient who returns to these activities after an admittedly severe operation with more than the usual share of complications. Such a result is particularly encouraging to a general practitioner. I shall certainly feel more justified in the future in urging elderly patients to brave the risks of prostatectomy rather than perish slowly in considerable misery. I am indebted to Mr. A. W. Adams for his operative skill, for his interest in the progress of this case, and for his kind permission to publish these notes.—I am, etc.,

December, 1935. CRESSWELL DAVIS.

Treatment of Asthma by Irradiation

SIR,—I read with interest the letter from Dr. Gilbert Scott in the *Journal* of January 18th (p. 132) on the use of *x* rays for the relief of patients suffering from asthma. I have been using this method of treatment for the last six years, following the technique described by Dr. Gilbert Scott. The cases I have treated may be roughly divided into three groups so far as their response to *x*-ray treatment is concerned.

1. A number of patients have remained symptom-free for one to two years following the treatment.
2. A second group of patients have remained symptom-free for six to nine months, followed by a relapse, which responded to further treatment. Subsequent attacks have been progressively milder in type.
3. Lastly, a number of patients were temporarily relieved by treatment, but the attacks recurred after a short interval.

Whether the benefit obtained is due to the action of the rays on the adrenals or whether it is a form of protein "shock" therapy, there is no doubt that in a number of cases the treatment is remarkably efficacious.—I am, etc.,

S. L. MUCKLOW, M.B., Ch.B.,
Cheltenham, Jan. 21st. D.M.R.E.

The Poisons Rules

SIR,—The misunderstandings arising upon the publication of the various versions of the Poisons Rules are surely due to the ambiguity of the language employed and to the conflicting interpretations which have been more or less officially put upon it. The confusion, in my submission, is largely caused by the indiscriminate, and as I think unwarranted, use by the Home Office of the word "manufacture" to include two entirely different and separate operations: (1) the *chemical* operation of *making* poisonous drugs which may be subsequently used in medicine; (2) the *pharmaceutical* operation of *mixing* such drugs for human use, an operation more usually described as "compounding" or "dispensing."

Mr. Geoffrey Lloyd accuses me of misunderstanding the terms and effect of Rule 29, and claims that the application of Rule 29 is "limited to establishments in which pharmaceutical preparations containing any poison are manufactured for the purpose of the internal treatment of human ailments." With all respect to him, I venture to assert that my interpretation is exactly in accordance with that which the Home Secretary put upon the Rule (as it then existed) in a letter addressed to me on July 23rd last, which with his permission was reproduced in the *Daily Telegraph* of July 30th, 1935. It runs as follows:

"The proposed Rule (27 of the Poisons Board Report) applies only to the manufacture of medicinal preparations, of which one or more of the ingredients is a poison, and not to the manufacture of any poison or other substance contained in the preparation."

Rule 27 has become Rule 29 in the current issue of the Rules. It differs from the previous Rule in restraining, as I submit, the registered medical practitioner from dispensing the poisonous drugs scheduled, with the exception of a small group of glandular products cited in the Rule. Moreover, in the official memorandum mentioned by me as having been circulated by the authority of the Home Secretary to the universities, bearing the date January 3rd, 1936, Rule 29 is thus interpreted:

"It is to be noted that the Rule is much more limited in scope than has frequently been supposed. It applies solely to the manufacture of *pharmaceutical preparations* to be taken

internally (that is, by swallowing or by injection) and *containing* poisons. The scope of the Rule does not extend to chemical work on the manufacture of poisonous chemical substances or compounds even although they may be destined subsequently to be used in making up pharmaceutical preparations, but is restricted to the preparation of *medicinal products* of which one or more of the ingredients is a poison."

The italics are as used in the memorandum, which is throughout designed to reassure the university graduate in chemistry that the Rule does not concern him, and the categorical statement is made that "the operations to which the Rule applies are, in fact, pharmaceutical and not chemical."

The position as I understand it is that Mr. Geoffrey Lloyd declares that the Rule is applicable *only* to the *making* of poisonous drugs which may be subsequently used in medicine; the Home Secretary declares that the Rule is applicable *only* to the pharmaceutical operation of *mixing* drugs which are poisons, and not to their separate manufacture. The Home Secretary's interpretation is clearly official, and disposes of Mr. Linstead's contention that the Rule "refers solely to manufacturing laboratories, and has no application to a doctor's dispensary or to a chemist's shop." This effort, in which Mr. Lloyd partly joins, to make the *place* of manufacture a determining factor, has no obvious sanction, and indeed seems wholly irrelevant. I consequently repeat my assertion that, whatever may have been the motives of the framers of Rule 29, its effect is to debar the registered medical practitioner (unless he is otherwise qualified) from dispensing any of the poisonous drugs scheduled as such, exception being made of the small list of glandular substances cited in the new Rule. As my letter of January 18th to you explicitly indicated, it is probable that a court of law would make short work of "Rules" or "departmental interpretations" of Rules which were found to be in conflict with provisions of the original Act. But it is surely preferable to avoid the necessity of litigation, always an expensive business in this country, by withdrawing Rules which, as events have demonstrated, are capable of so many different and contradictory interpretations.—I am, etc.,

London, Jan. 25th. E. GRAHAM-LITTLE.

Voluntary Euthanasia

SIR,—I have followed the correspondence on the above subject with interest, and it is somewhat surprising to me that no one has referred to the opprobrium which would, justly in my opinion, fall upon those responsible for assisting in effecting the execution of their relative. In a large town this might soon be forgotten, but not so in the small town or village. Of this, after an experience of upwards of forty years' practice in such a district as the latter, I am convinced. Of one other thing I am convinced—voluntary euthanasia will not come in this generation or the next, if ever.—I am, etc.,

Bushey, Herts, Jan. 25th. THOMAS FENTEM, M.D.

Birth Control in Modern Life

SIR,—To my mind your correspondent Dr. E. S. Miller (*Journal*, January 11th, p. 87) strikes the right note at last in the desultory correspondence about contraception.

Birth control has undoubtedly come to stay, and not all the opposition, based upon various motives, can stop it. Indeed, legislation aimed at its prohibition would produce a business of "rubber running" that would put American bootleggers in the shade. It cannot be abolished, but it might be guided and directed.

At present the only people who know nothing about it are those with very rudimentary ideas upon citizenship and responsibility to posterity. It is possible that our race has passed its zenith, and will inevitably decline; but present social arrangements appear to be directed in many ways so as to accelerate this declination.—I am, etc.,

Cornwall, Jan. 20th. L. A. RIDDELL.

Testimonial to Dr. E. R. Fothergill

SIR,—Dr. Rowland Fothergill is a member of the Hospitals Committee whose services I, as its chairman, value greatly. The absence of my name as a signatory to the appeal for a testimonial to him from the profession might make it appear that I was not in accord with this appeal. This is not the case, and the reason why my name was not included is, I understand, that in the hurry there was no time to communicate with me. I yield to no one in my admiration of Dr. Fothergill's energies and in my appreciation of the value of his services to the British Medical Association, and I trust that the appeal which has been issued will be regarded by the medical profession as an opportunity which they will be only too glad to seize.—I am, etc.,

York, Jan. 22nd. PETER MACDONALD.

*** We warmly associate ourselves with Dr. Macdonald's closing sentence.—ED., *B.M.J.*

GLAXO LABORATORIES AT GREENFORD

Glaxo Laboratories Ltd., well known for its pharmaceutical and food products, has left its premises near Regent's Park and established itself in new buildings on a fifteen-acre site at Greenford in Middlesex. The buildings, in open and pleasant surroundings, are a noteworthy addition to industrial architecture. They express the newest ideas in factory and laboratory design, and are so extensive that it took our representative an hour and a half under expert direction to make even their superficial acquaintance. The main building houses the offices, general laboratory, and principal factory and dispatching departments, and a separate building, connected only by a corridor bridge, is set aside for the bacteriological and physiological laboratories. There are three separate blocks for the manufacturing laboratories, where the technical processes in connexion with vitamin concentrates, fine chemicals, and cereal foods are conducted. The more recent developments of the firm concern the production of vaccines as well as an increasing number of pharmaceutical preparations, and there is abundant research and other provision for these.

A tour of the building introduced us to various pieces of scientific equipment which it would be tiresome to describe, but the ampoule department particularly took the fancy. This contains a machine which, with far more than human patience and precision, fills, seals, and labels 18,000 ampoules a day. Its only requirements are a daily oiling at seventy-five points, and an attendant who loves it! Failing the latter, while the ampoules are served with the same fastidiousness, the sensitive machine lets it be known that it is aware of the denial of affection. A special facility for opening the ampoules is provided—a touch with a little piece of carborundum, and the neck of the ampoule is severed with a neatness which the most scientific executioner would envy. The physiological laboratories include animal experimental and diet rooms, where intensive investigations are carried out and vitamin products tested on a colony of white rats under strictly controlled conditions. In the bacteriological department a new type of immunological product under the name of "dissolved vaccines G.L." has lately been issued, the result of a piece of research having as its aim the production of a vaccine in which the bacterial cells are in solution and the toxic bacterial products are at the same time detoxicated. A visit to the different departments suggested even to the casual eye the continuous attention which has to be given by a firm of reputation to the accurate standardization of its products to the desired quality, purity, and biological potency. We are informed that any members of the medical profession who may wish to visit the premises at Greenford and inspect the technical departments will be cordially welcomed.

Obituary

S. R. DOUGLAS, F.R.S., F.R.C.P.

Deputy Director, National Institute for Medical Research

Since the early years of the present century there has been no more familiar or popular figure in British, and more particularly in London, circles concerned with bacteriology, pathology, and medical research, than that of Captain S. R. Douglas, whose death near the close of his sixty-fifth year, after only a few days of illness, occurred on January 20th. There are many in whom the sad news will awaken memories of the genial friendliness and unobtrusive helpfulness which characterized his relations with all who shared his interests. For the following memoir we are indebted to Sir Henry Dale.

Stewart Ranken Douglas was born at Coulsdon Grange, Caterham, in March, 1871, and received his education at Haileybury and at St. Bartholomew's Hospital. There is nothing on record to suggest that his student career gave any promise of future scientific interests or distinction. From his own infrequent references to those early days his friends could picture him, indeed, as a student of good intelligence, with a zest for manly sports, content to give to his professional studies no more industry than was required for the London Conjoint qualification in 1896. Thereafter he set his course for the Indian Medical Service, into which he passed with the rank of surgeon lieutenant in 1898. After two years in India, including a spell of active service on the North-West Frontier, and good work for the Plague Commission in 1899, Douglas was in China in 1900–1 as a medical officer with the expedition sent to deal with the Boxer rebellion. He received the service medal and promotion to the rank of captain. During these years of varied experience Douglas had picked up an infection with the dysenteric amoeba, and on return to India he had a long and serious illness, with an amoebic liver abscess. He recovered, but with health so broken that he was invalided out of the Service, and returned to England in December, 1901. He never, in fact, became completely free from the after-effects of this illness. Recurrent attacks of dysentery plagued him until, in 1916, he submitted to drastic treatment with emetine–bismuth iodide, with expert protozoological control by his future colleague Clifford Dobell. He was thus rid of the amoebic infection, but was left with an intractable sciatica, from which he never really became free. Soon after his return to England, however, he began, in spite of the handicap of his poor health, to make a new career for himself as a bacteriologist. He became assistant to Dr. (now Sir) Almroth Wright at St. Mary's Hospital, forming thus an association which had a strong and lasting influence on his attitude to pathological problems and on his methods of work. We learn from those who were with him in the enthusiastic team which worked under Wright's leadership that Douglas became the recognized master among them in the special technical methods which grew out of Wright's ideas. He was Wright's collaborator in the experiments which came to publication in a series of papers, from 1903 onwards, on the opsonic index and its use as a guide to preventive or curative inoculation with vaccines of killed bacteria. When the inoculation department was formed as a separate organization at St. Mary's, Douglas became, in 1907, the assistant director. In 1912 he was appointed lecturer in bacteriology to the hospital.

When, late in 1913, the newly appointed Medical Research Committee decided to devote part of the fund which it administered to the formation of a National Research Institute the first appointment made was that of Sir Almroth Wright, to be director of the department of bacteriology and experimental pathology. Subsequently Sir Leonard Hill, Dr. John Brownlee, and myself were appointed to direct other departments. Sir Almroth Wright at once nominated Douglas for appointment as his chief assistant, but the appointment was not formally made by the Committee until August 1st, 1914. The declaration of war with Germany, a few days later, scattered us all on various war duties, the former Mount Vernon Hospital at Hampstead, which the Committee had acquired to house its proposed Institute, becoming a military hospital for the next five years. Douglas, joining the R.A.M.C., went to Boulogne with Wright, but his health soon gave way under the strain of trying to work in damp and draughty emergency quarters, and he had to be invalided back to England. Returning to St. Mary's Hospital, in spite of the sciatica and dysentery which periodically put him out of action, he successfully organized the production of vaccines on a very large scale for the British and Allied Armies. Already, on October 10th, 1914, he published in the *Lancet* a paper dealing with a method, of enormous value at the time, for making good bacteriological media without the peptone of German manufacture which had till then been a staple constituent of such media for a large part of the world. Douglas's simple method of digesting meat directly with trypsin, and thus producing a broth containing peptones and albuminoses as well as the extractives of an ordinary bouillon, rapidly passed into general use ; and with the improvements which were later introduced, particularly by P. Hartley, who was afterwards to be one of his colleagues at the National Institute, it has become one of the standard methods of bacteriology. Douglas during the war years also did valuable work on bacillary dysentery and on the infection of war wounds. His services to the Allied Armies, as well as to that of his own country, received recognition when he was made Chevalier de l'Ordre Couronne de Belgique.

When the war ended more than a year was occupied in regaining possession of the building at Hampstead and refitting it as an institute for laboratory research in medicine. Sir Almroth Wright decided to return to St. Mary's Hospital and continue his work among his familiar surroundings and equipment, and it fell to Douglas, as acting director, to plan the department of bacteriology and experimental pathology at Hampstead. He was soon made full director of this largest department of the new Institute, and held that position to the end. Only two of his original associates in it remained there at the time of his death, each with his own subdepartment ; the other present members all joined the staff during the years of Douglas's directorship. The department, in effect, has grown up under his effective but unobtrusive leadership. His wide and varied knowledge of disease and of the methods of pathology, his ingenuity and his shrewd judgement, have played a large though always inconspicuous part in what it has achieved. Even more important, for its success as a community of investigators, has been the constant example given by Douglas of unselfish willingness to help and to co-operate, and of enthusiastic pleasure in any addition to knowledge made by the work of a colleague, without thought of recognition for what his own advice or direction had contributed to the result. When the Medical Research Council asked the Institute to frame a scheme of work on virus infections Douglas had the chief concern in its initiation. He was largely responsible for the choice of dog distemper as a central item of the initial programme, and his knowledge of country life suggested the ferret as an accessory subject for experiments on this disease. As is well known, this suggestion not only contributed to the success obtained in reaching the original objective, but has later become fruitful in a different and unexpected direction.

In another case, familiar to all those who have worked so happily under his easy-going and friendly direction, a virus, which has since become of great experimental value, was discovered, and its nature first investigated, under Douglas's immediate and detailed supervision, though his name was not at the head of the papers when the time came for publication.

Douglas's uncertain health, leaving him but seldom free from some measure of pain and disability, would, I think, have prevented him in any case from working assiduously and intensively at the laboratory bench. He lacked, moreover, something of the preliminary training in the more fundamental sciences which modern medical research increasingly demands. His modesty tended to exaggerate his own sense of such gaps in his equipment, and his love of co-operation and genial interchange of ideas weakened a never strong liking for concentrated individual effort. He tended, therefore, as the years went by, to work more and more through his associates and less with his own hands. It is very probable, however, that he thus did a greater service to science than he would ever have rendered by intense personal activity in research. He was able to cultivate a wide knowledge of the problems engaging his colleagues, and of those elsewhere working in the same field ; he was constantly fruitful of ingenious suggestion and of shrewd, though always friendly, criticism; and he had a real genius for encouragement and for quietly lubricating the machinery of co-operation.

As time passed, and some of the original departments of the Institute were transferred or merged with the death or retirement of their first leaders, its organization was simplified, and Douglas added the responsibilities of deputy director of the Institute to the leadership of his own department. Here also his loyal friendship and self-effacing helpfulness were beyond praise or acknowledgement. He was always ready to take a tiresome and thankless responsibility for some aspect of the equipment, the facilities, or the amenities of the Institute as a whole, or to give time for discussion or advice on any matter affecting the general interest ; but he seemed to avoid by instinct anything which would enlarge the scope of his own authority, or which would give him any personal prominence. His chosen role among all of us, his colleagues, was that of a genial comrade and a wise elder brother, and he fitted it to perfection.

Douglas had a liking for country life and sports, and a healthy relish for the pleasures of normal men. He was a field naturalist and a keen fisherman, loved a day's shooting, enjoyed a good dinner, and knew good wines. In 1920 he married Frances Miriam Clare, née Dayrell, widow of J. B. Nias, M.D. For some years he had rented a cottage in the Shetland Isles, and later acquired a small property there. There he and Mrs. Douglas spent happy fishing holidays, and showed a perfect hospitality to friends who shared their enjoyment. He was a delightful companion, full of good stories and entertaining memories from a full and varied life. One felt that his approach to science was that of the cultivated amateur of a former generation, rather than that of the newer type of professionally trained research worker. Perhaps for that reason, he brought into the laboratory an air of fresh and unpedantic interest, of balanced judgement, and of shrewd common sense. He was, indeed, the most human and most lovable of colleagues and friends. His fellow workers at the National Institute, and in a wide circle beyond it, will sadly miss his sane and genial presence.

H. H. D.

Douglas was elected F.R.S. in 1922 and F.R.C.P. in 1933. A number of publications on bacteriological technique, on vaccines, on cultivation and properties of the tubercle bacillus, etc., stand in his own name ; but his major contribution to science is to be found in work published by others. He joined the British Medical Association in 1909, and served as vice-president of the Section of Haematology and Vaccine Therapy at the Annual Meeting that year at Belfast. Many years later, at the Centenary Meeting in London, he was vice-president of the Section of Bacteriology. He was a member of the Vaccination and Immunization Subcommittee in 1933–5, and of the special committee which drew up the report on immunization, including vaccination, published in our *Supplement* on June 22nd, 1935.

The Services

HONORARY PHYSICIAN TO THE KING

Colonel W. H. Hamilton, C.I.E., C.B.E., D.S.O., I.M.S., has been appointed Honorary Physician to the King, *vice* Colonel E. C. Hodgson, D.S.O., I.M.S. (ret.).

Universities and Colleges

UNIVERSITY OF OXFORD

Radcliffe Travelling Fellowship

An examination for a Radcliffe Travelling Fellowship of the annual value of £300, and tenable for two years, will be held at the University Museum, commencing on February 18th, at 10 a.m.

Candidates must have passed all the examinations required by the University for the B.A. and B.M. degrees. They must not have exceeded four years from the time of passing the last examination required for the B.M. The successful candidate must before election declare that he intends to devote himself during his tenure of the Fellowship to the study of medical science, and to travel abroad with a view to that study. The Fellowship will be vacated *ipso facto* by a Fellow who spends more than twelve months in the whole within the United Kingdom. The examination will occupy four days. Papers will be set in physiology, pathology, and preventive medicine, and a subject will be proposed for an essay ; there will also be a practical examination in pathology. Any candidate desiring to offer in addition a special branch of either medicine or surgery must send notice of this to the Regius Professor of Medicine by February 13th. Intending candidates should send their names, addresses, qualifications, etc., to the Regius Professor of Medicine, University Museum, by February 13th.

Hunt Travelling Scholarship

The George Herbert Hunt Travelling Scholarship is awarded without examination every second year to a graduate in medicine of the University (of either sex) who has not exceeded five years from the date of passing the final examination for the B.M. degree.

The scholarship is of the value of £100, or such smaller sum as two years of the income of the Fund provides. Candidates are required to submit with their applications a statement of their academic record together with testimonials (five copies) and an undertaking that if elected they will travel abroad for a period of not less than three months for the purpose of clinical study or research in medicine. In making the award a preference is given to such candidates as express the intention of engaging in the practice of their profession either as surgeons or general practitioners. The scholar must complete his period of travel within twelve months from election, and within a reasonable period thereafter submit to the dean of the Medical School a detailed report of his tenure of the scholarship. The next election will be made on April 9th. Applications must reach the dean of the Medical School, University Museum, Oxford, by February 24th.

At a congregation held on January 23rd the following medical degrees were conferred:

B.M.—G. A. Hodgson, G. M. Afoumado, E. M. Fisher.

UNIVERSITY OF CAMBRIDGE

On the nomination of the Faculty Board of Medicine the General Board has appointed Dr. T. Shirley Hele, Master of Emmanuel College, to be Assessor to the Regius Professor of Physic until December 31st, 1936.

At a congregation held on January 25th the following medical degrees were conferred:

M.D.—B. C. Thompson, C. H. Wrigley, D. N. R. Jones.
M.B., B.CHIR.—S. M. Davidson, K. C. Bailey.
M.B.—W. Warren.
B.CHIR.—L. J. Bacon, T. L. H. Shore, G. N. St. J. Hallett, J. R. Kerr, J. R. G. Harris, A. G. Salaman, J. R. J. Winter, C. A. Dowding, F. Stansfield, R. D. Ewing.

Medical Notes in Parliament

In both Houses of Parliament on January 23rd Orders under the Pharmacy and Poisons Act, 1933, were laid for confirmation. These were: (1) Poisons List Confirmation Order, dated December 21st, 1935, made by the Home Secretary under Section 17 (4) of the Act, and confirming the already published list of the substances to be treated as poisons for the purposes of the Act. (2) Poisons (Approved Institutions) Order, of the same date, approving certain hospitals and other institutions for the purpose of Section 20 (4) of the Pharmacy and Poisons Act. (3) Poisons Rules, 1935, dated December 21st, and made by the Home Secretary under Section 23 of the Act. These Orders are open to debate if objection to them is entered and a "prayer" moved within the allotted time.

Both Houses will resume their sittings on February 4th, and the committee stage of the Voluntary Hospitals Bill is set down for the first business of the House of Lords on that day.

Medical News

Dr. G. Scott Williamson will speak on "The Pioneer Health Centre" before the University College Hospital Medical Society, Gower Street, W.C., on Thursday, February 13th, at 5 p.m.

Sir Weldon Dalrymple-Champneys will read a paper (illustrated by cinematograph film) on "The Sterilization of Surgical Catgut" before the Section of Surgery of the Royal Society of Medicine, on Wednesday, February 5th, at 8.30 p.m. A discussion will follow.

A course of four lectures on "The Psychological Clinic and Community Welfare" will be given at the Liverpool Psychiatric Clinic, 56, Bedford Street North, Liverpool, on Wednesdays at 5.15 p.m. from February 5th to 26th. The fee for the course is 10s. (single lectures, 3s. 6d.), and written application for tickets should be addressed to the lecture secretary at the clinic.

A new post-graduate course opened at the National Hospital, Queen Square, W.C.1, on January 27th, and will be continued till Friday, March 27th. The course includes: out-patient clinics and lectures and clinical demonstrations on each week-day, except Saturday, at 2 p.m. and 3.30 p.m. respectively; demonstrations on the pathology of the nervous system, on Wednesdays and Thursdays at 12 noon; and demonstrations on the physiology of the nervous system, on Tuesdays at 12 noon. The fee for the course is £10 10s., and for clinical clerks or those who hold perpetual tickets £8 8s. Special arrangements will be made for those who cannot take the whole course.

At Monaco from February 10th to 12th there will be held the first meeting of a new society which has been formed with the object of revising the rules of warfare. Politicians, judges, and several distinguished members of the French Medical Corps will attend. There will be discussions directed notably to reviewing the laws pertaining to the protection of the civil community in times of war. L'Académie Diplomatique Internationale will hold a session at the same time and direct its studies to the same end.

The Fellowship of Medicine announces that surgical tutorial classes will be given at the National Temperance Hospital, at 8.30 p.m.: on February 4th, intestinal obstruction; February 6th, thorax; February 11th, injuries to joints, muscles, and tendons; February 13th, kidney and bladder. For candidates for the Primary F.R.C.S. examination a course of lecture-demonstrations in anatomy and physiology will be held at the Infants Hospital on Mondays, Wednesdays, and Fridays, at 8 p.m., from February 24th to April 24th. Advanced courses include gynaecology, at Chelsea Hospital for Women, February 10th to 22nd; M.R.C.P. evening clinical course, at National Temperance Hospital, Tuesdays and Thursdays, at 8 p.m., February 25th to March 12th; orthopaedics, at Royal National Orthopaedic Hospital, March 9th to 21st. Courses particularly suitable for general practitioners include the following: physical medicine, at St. John Clinic and Institute of Physical Medicine, February 8th and 9th; children's diseases, at Princess Elizabeth of York Hospital, February 22nd and 23rd; chest diseases, at Brompton Hospital, March 7th and 8th; clinical surgery, at Royal Albert Dock Hospital, March 14th and 15th. Courses are open only to members and associates, and full particulars and detailed syllabuses may be obtained from the Fellowship of Medicine, 1, Wimpole Street, W.

On account of the lamented death of His Majesty King George V the President and Council of the Royal College of Surgeons of England have decided not to hold the Hunterian Festival dinner on Friday, February 14th. The Hunterian Oration will be delivered by Mr. C. H. Fagge at 4 p.m. on that day as arranged.

The discourse before the Royal Institution by Professor Edward Mellanby, on "Recent Advances in the Treatment of Disease," arranged for to-day (Friday, January 31st) at 9 p.m., has been postponed.

Owing to the death of His Majesty King George V the annual dinner of the Royal Society of Medicine, which was to have been held on February 19th, has been postponed.

The St. George's Hospital Medical School Ball, which was to have been held at Grosvenor House, Park Lane, on February 19th, has been cancelled owing to the national mourning.

Dr. D. C. Norris (Inner Temple) and Dr. F. Collar (Middle Temple) were called to the Bar on January 27th.

The inauguration of the Académie de Chirurgie will take place at the Paris Faculty of Medicine on February 4th in the presence of the President of the Republic and under the presidency of the Minister of Education. Dr. Louis Bazy will relate the history of the Académie Royale de Chirurgie and the Société Nationale de Chirurgie.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to **The EDITOR, British Medical Journal, B.M.A. House, Tavistock Square, W.C.1.**

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone, unless the contrary be stated. Correspondents who wish notice to be taken of their communications should authenticate them with their names, not necessarily for publication.

Authors desiring REPRINTS of their articles published in the *British Medical Journal* must communicate with the Financial Secretary and Business Manager, British Medical Association House, Tavistock Square, W.C.1 on receipt of proofs. Authors over-seas should indicate on MSS. if reprints are required, as proofs are not sent abroad.

All communications with reference to ADVERTISEMENTS, as well as orders for copies of the *Journal*, should be addressed to the Financial Secretary and Business Manager.

The **TELEPHONE NUMBER** of the British Medical Association and the *British Medical Journal* is EUSTON 2111 (internal exchange, five lines).

The **TELEGRAPHIC ADDRESSES** are
EDITOR OF THE *BRITISH MEDICAL JOURNAL, Aitiology Westcent, London.*
FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate Westcent, London.*
MEDICAL SECRETARY, *Mediseora Westcent, London.*

The address of the B.M.A. Scottish Office is 7, Drumsheugh Gardens, Edinburgh (telegrams: *Associate, Edinburgh*; telephone: 24361 Edinburgh), and of the Office of the Irish Free State Medical Union (I.M.A. and B.M.A.), 18, Kildare Street, Dublin (telegrams: *Bacillus, Dublin*; telephone: 62550 Dublin).

QUERIES AND ANSWERS

Treatment of Seborrhoea

"A. B." writes: I have a case of seborrhoea of the scalp and face in a woman aged 35 years. It started in the scalp and spread to the upper half of the face. It is now appearing on the vulva, accompanied by severe pruritus. I would be glad if any of your readers could suggest a remedy.

Priapism after Prostatectomy

Dr. S. A. ISAACS writes from Savanna-la-Mar, Jamaica, B.W.I., in reply to the query of "C. C. H." (December 21st, 1935, p. 1240): May I suggest massage of the seminal vesicles, and, if successful, will he write to me?

Income Tax

Allowance for Car Expenses

"M.O.H." receives a fixed annual allowance from his council to cover upkeep of a car. Last year his expenditure exceeded the allowance by 50 per cent.; this year it will be less than the allowance. The inspector of taxes is asking that a detailed note of the expenses should be attached to the declaration for the 1936–7 assessment.

*** Where a council pays an allowance of this kind it often proves insufficient in a particular year, and we have consistently advised our correspondents against appealing for a special deduction, pointing out that in the long run such allowances usually work out approximately correct. We think that the converse applies where the allowance exceeds—as it may occasionally do—the year's expenses. Unless—which seems absurd—the allowance is given on such generous terms that it amounts to a concealed addition to the real emoluments of the office, we feel sure that the authorities would not desire local officials to seek to investigate the extent to which a car allowance is excessive or (the converse must then apply) inadequate.

LETTERS, NOTES, ETC.

Pipe v. Cigarette

Dr. F. WILLIAM COCK (Appledore, Kent) writes by way of comment on Dr. Frederick Dillon's letter (January 4th, p. 44): The cigarette is a mere habit, analogous to the snuff-taking of the eighteenth century: an introduction to polite conversation, a breaking of the ice of shyness, but with few exceptions no good at all for the satisfaction of real tobacco hunger. Besides, Sir, the cigarette is the bane of insurance companies, the destroyer of forests and woody commons, not to speak of carpets, armchair covers, tablecloths, and the tempers of tidy people who find their household gods covered with the cigarette ashes of contemptuous youth scattered with careless hand wherever it goes. But look at that *tuba vel fistula mirifica*, the friend possibly of years, the *pipe*. It means a real smoke, a friend, a companion for at least a quarter of an hour—double that to a careful user. One that brings to remembrance many a happy time of sport, of travel, of reading, or of anything that is of pleasant memory; nay, more, it is the consoler in many a trouble and anxiety. Again, its duration of enjoyment beats cigarette smoking hollow, for from experience I have seen that the cigarette smoker who wants tobacco must go on stub-lighting for a long time, and what a filthy mess a forty-cigarette-pile of stubs is! No, Sir, a pipe well cleaned (I can give a prescription that keeps a *good* pipe in first-class order for two years) beats a cigarette all to smithereens and still remains useful when the half-smoked stub has been picked off the gutter, finding its end in the clay pipe of the lodger in a doss-house.

Hearing Aids

Captain L. V. K.-REIN (London) writes: It was with particular interest that I read the article on hearing aids in your issue of January 4th (p. 21), and I feel that in fairness to those research workers whose energies have been devoted to developing and improving the specifications of the individual aids that are worn on the person some mention should be made of the quality and particular performance of individual products rather than classify the faults that exist in the cheaper and mass-produced makes. In the light of investigations carried out in connexion with the Three Years Hearing Aid Research Survey, specifications were established which have made it possible to match the patient's auditory response, as shown from our audiometer test, in chart form, as a hearing curve, and this by the simple process of interchanging carbon diaphragms and receivers, in order that the performance curve of the aid supplied may most nearly compensate the indicated loss at the frequency position demanded. In practice some thousands of these instruments have been supplied in connexion with practically every important hospital of the day, and the practical value of such apparatus may be judged when it is realized that thousands of employees in a commercial walk of life would be wholly unable to carry out their occupation unless such light, inconspicuous, and adaptable appliances were available. As no mention is made of the development of bone-conduction aids, it may be opportune to record that these are now available for the portable as well as for the valve type of apparatus, and the use of a bone-conduction testing receiver, when used with the Western 2B audiometer, has given a series of records on which have been based the data, making it possible most nearly to match the patient's bone-conduction response curve with this type of instrument in the same manner as with an air-conduction aid. There is unquestionably much work to be done yet, and it is hoped that as a result of present investigations a method of establishing the percentages of bone-conduction capacity as compared with air conduction will soon be arrived at—a factor which would simplify the fitting of hearing aids.

Flavine Products

We have received from Messrs. Boots of Nottingham copies of recent literature on their flavine products. These include an interesting historical survey of Ehrlich's work on the subject and an outline of the physical, chemical, and bactericidal properties of the flavine group. The detailed methods of application of acriflavine emulsion as a general surgical dressing are described, and reference is made to the use of acriflavine in the treatment of gonorrhoea, and the use of proflavine in general ophthalmology. There is a very comprehensive list of references, and details are given as to the exact types of preparation produced.

Climate of North Wales

Dr. DENNISON PICKERING writes from Penmaenmawr: During the spells of foggy and wintry weather which have occurred this winter, the wireless and newspaper reports have described fog and wintry conditions as general, the only places specifically mentioned at various times as being free from such conditions being places in the South of England, particularly on the coasts. During the whole of this time, at Penmaenmawr, we have had no fog; snow on one occasion for a few hours only; frost perhaps four or five times, only once lasting after breakfast time, and never more than a few degrees. There have also been a large number of bright sunny days. It seems hardly fair that this state of affairs on the North Wales coast should be passed over without comment, and that this district should be included in the general North Wales weather reports, which apply almost entirely to the inland mountainous districts.

*** Dr. Pickering, in a later communication, mentions that since writing the above letter there have been two falls of snow of about three inches each and one day of moderate frost.

Improvements in Spa Treatment at Bath

Two improvements in the application of the thermal waters of Bath are announced. The first is in the administration of the waters in an atomized form for inhalation purposes. In the past atomization has always involved the lowering of the temperature of the water, a distinct disadvantage in the opinion of members of the medical profession who advise this form of treatment. Measures have now been devised to enable the spray to be administered at a higher temperature by carrying the atomized waters through a specially designed electric heater. Before passing through the heater the atomized water is sterilized. The second improvement is the use of a new kind of aeration bath. The whirlpool bath has long been known as a method of balneological treatment. In the aeration bath, a development of the whirlpool bath, air is introduced into the water at the foot of the bath, a method which, it is claimed, reproduces by mechanical means the advantages of gentle massage.

Messrs. Roberts and Co. (76, New Bond Street, W.1) have issued, for professional circulation only, a fifth edition of their *Prescriber's List*, giving in alphabetical order the chief proprietary drugs in common use, with the names of their makers, their composition, price, dosage, etc.

Vacancies

Notifications of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals will be found at pages 50, 51, 52, 53, 56, 57, and 58 of our advertisement columns, and advertisements as to partnerships, assistantships, and locumtenencies at pages 54 and 55.

A short summary of vacant posts notified in the advertisement columns appears at page 244.

Naval, Military, and Air Force Appointments

ROYAL NAVAL MEDICAL SERVICE

Surgeon Commanders G. W. Woodhouse to Royal Naval Hospital, Portland; R. W. Higgins to the *President*, for course; W. G. C. Fitzpatrick to the *Victory*, for Royal Naval Barracks, February 15th, and to the *Vernon*, February 24th.

Surgeon Lieutenant Commander W. A. Hopkins to be Surgeon Commander.

Surgeon Lieutenant Commander T. F. Crean to the *Pembroke*, for Royal Naval Barracks, Chatham.

Surgeon Lieutenants D. W. Walker to the *Pembroke*, for Royal Marine Infirmary, Deal; T. McCarthy to the *Furious*.

ROYAL NAVAL VOLUNTEER RESERVE

Probationary Surgeon Lieutenant H. J. Wade to the *Excellent*.

H. B. Howell has entered as Probationary Surgeon Lieutenant.

Probationary Surgeon Sublieutenants J. A. Shepherd and D. S. Macphail to be Surgeon Sublieutenants, with seniorities December 3rd, 1934, and January 2nd, 1935, respectively.

ROYAL ARMY MEDICAL CORPS

Major T. C. Bowie has retired on retired pay.

Captains T. W. Davidson, C. R. Christian, and J. G. E. Vachell to be Majors, May 1st, 1934, May 1st, 1934, and January 29th, 1935, respectively. (Substituted for the notifications in the issues of the *London Gazette* of May 8th, 1934, and February 15th, 1935.)

ROYAL AIR FORCE MEDICAL SERVICE

Flying Officers A. W. Smith and J. W. Patrick (January 7th, 1935), J. S. Wilson (January 16th, 1935), C. A. Lewis (March 7th, 1935), R. G. James (July 7th, 1935), and G. H. Stuart (October 29th, 1935) to be Flight Lieutenants, with the seniorities indicated in parentheses.

Flying Officer R. S. Peill to R.A.F. Station, North Coates Fitties.

ROYAL AIR FORCE RESERVE: MEDICAL BRANCH

Flying Officer T. P. Mulcahy has relinquished his commission on appointment to a commission in the Indian Medical Service.

REGULAR ARMY RESERVE OF OFFICERS

ROYAL ARMY MEDICAL CORPS

Captain W. G. Burns has resigned his commission and retains the rank of Captain.

TERRITORIAL ARMY

ROYAL ARMY MEDICAL CORPS

Captain G. W. Wright, M.M., T.D., to be Major.

Lieutenant R. Rutherford to be Captain.

To be Lieutenants: H. Weir, late Cadet Sergeant, Glasgow University Contingent, Senior Division, O.T.C.; J. L. Gowan, late Cadet, George Watson's College Contingent, Junior Division, O.T.C.

Association Notices

SCHOLARSHIPS AND GRANTS IN AID OF SCIENTIFIC RESEARCH

Scholarships

The Council of the British Medical Association is prepared to receive applications for Research Scholarships as follows: an Ernest Hart Memorial Scholarship of the value of £200 per annum, a Walter Dixon Scholarship of the value of £200 per annum, and three Research Scholarships each of the value of £150 per annum. These Scholarships are given to candidates whom the Science Committee of the Association recommends as qualified to undertake research in any subject (including State medicine) relating to the causation, prevention, or treatment of disease. Preference will be given, other things being equal, to members of the medical profession. Each Scholarship is tenable for one year, commencing on October 1st, 1936. A Scholar may be reappointed for not more than two additional terms. A Scholar is not necessarily required to devote the whole of his or her time to the work of research, but may hold a junior appointment at a university, medical school, or hospital, provided the duties of such appointment do not interfere with his or her work as a Scholar.

Grants

The Council of the British Medical Association is also prepared to receive applications for Grants for the assistance of research into the causation, treatment, or prevention of disease. Preference will be given, other things being equal, to members of the medical profession and to applicants who propose as subjects of investigation problems directly related to practical medicine.

Conditions of Award: Applications

Applications for Scholarships and Grants must be made not later than Saturday, May 9th, 1936, on the prescribed form, a copy of which will be supplied on application to the Medical Secretary of the Association, B.M.A. House, Tavistock Square, London, W.C.1. Applicants are required to furnish the names of three referees who are competent to speak as to their capacity for the research contemplated.

DIARY OF SOCIETIES AND LECTURES

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn Fields, W.C.—*Mon.*, 5 p.m., Professor A. M. Boyd: The Investigation of Peripheral Vascular Disease. *Wed.*, 5 p.m., Professor H. Osmonde Clarke, Injuries of the Carpal Bones. *Fri.*, 5 p.m., Professor F. H. Bentley, Wound Healing *in vitro*—The Interrelation of Epithelial and Fibrous Tissue Growth.

ROYAL SOCIETY OF MEDICINE

Section of Orthopaedics.—Tues., 5.30 p.m. (Cases at 4.30 p.m.) Demonstration by Mr. Eric I. Lloyd: A Director for the Insertion of the Smith-Petersen Nail in Collum Femoris Fractures.

Section of Pathology.—Tues., 8.15 p.m. Laboratory Meeting at Department of Pathology, St. Thomas's Hospital Medical School.

Section of History of Medicine.—Wed., 5 p.m. Paper by Professor Alexander Haddow: Historical Notes on Cancer from the MSS. of Louis Westenra Sambon.

Section of Surgery.—Wed., 8.30 p.m. Paper by Sir Weldon Dalrymple-Champneys: The Sterilization of Surgical Catgut. A discussion will follow.

Section of Tropical Diseases and Parasitology.—Thurs., 8.15 p.m. Demonstration by Professor R. T. Leiper: The Crustacea as Helminth Intermediaries. Paper by Dr. B. G. Peters: Some Recent Developments in Helminthology.

Section of Otology.—Fri., 10.30 a.m. (Cases at 9.30 a.m.) Discussion: Value of Radiology in Diseases of the Ear. Openers, Mr. W. Stirk Adams, Mr. T. E. Cawthorne, and Dr. M. Mitman.

Section of Laryngology.—Fri., 5 p.m. Clinical Meeting. Short Communication by Mr. Maxwell Ellis: The Mechanism of Bronchial Movements and the Naso-pulmonary Reflex. Cases will be shown at 4 p.m.

Section of Anaesthetics.—Fri., 8.30 p.m. Paper by Dr. I. W. Magill: Anaesthetics in Thoracic Surgery, with Special Reference to Lobectomy.

ST. JOHN CLINIC AND INSTITUTE OF PHYSICAL MEDICINE, Ranelagh Road, S.W.—*Fri.*, 4.30 p.m., Mr. L. Attkins, Oral Sepsis in Relation to Physical Disease.

UNIVERSITY COLLEGE, W.C.—*Mon.*, 5 p.m., Dr. H. R. Ing: Chemical Structure and Pharmacological Action. *Tues.*, 5 p.m., Mr. G. P. Wells: Comparative Physiology. *Thurs.*, 5 p.m., Dr. F. G. Young: Glycogen and the Metabolism of Carbohydrates.

WEST LONDON MEDICO-CHIRURGICAL SOCIETY.—At De Vere Hotel, Kensington Road, W., *Fri.*, 7.30 p.m., Dinner; 8.30 p.m., Discussion: Epistaxis. To be opened by Dr. Geoffrey Evans and Mr. C. Hamblen Thomas.

POST-GRADUATE COURSES AND LECTURES

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole Street, W.—*St. John's Hospital*, 5, Lisle Street, W.C.: Afternoon Course in Dermatology. *St. Mark's Hospital*, City Road, E.C.: All-day Course in Proctology. *West End Hospital for Nervous Diseases*, Welbeck Street, W.: All-day Course in Neurology. *St. John Clinic and Institute of Physical Medicine*, Ranelagh Road, S.W.: Sat. and Sun., Course in Physical Medicine. *National Temperance Hospital*, Hampstead Road, N.W.: Surgical Tutorial Classes—Tues., 8.30 p.m., Mr. A. J. Cokkinis, Intestinal Obstruction; Thurs., 8.30 p.m., Mr. T. Holmes Sellors, Thorax.

CENTRAL LONDON THROAT, NOSE AND EAR HOSPITAL, Gray's Inn Road, W.C.—*Fri.*, 4 p.m., Mr W. A. Mill, Earache in the Normal Ear.

HOSPITAL FOR SICK CHILDREN, Great Ormond Street, W.C.—*Wed.*, 2 p.m., Clinical Lecture, Mr. Denis Browne, Empyema; 3 p.m., Clinico-pathological Lecture, Dr. W. W. Payne, Vitamin Deficiency as a Predisposing Factor in Infection. Out-patient Clinics, mornings, 10 a.m. to 12 noon. Ward Visits, afternoons, 2 p.m. to 3.30 p.m.

INCORPORATED DENTAL SOCIETY AND PUBLIC DENTAL SERVICE ASSOCIATION.—At London School of Hygiene and Tropical Medicine, Keppel Street, W.C.: *Thurs.*, 8 p.m., Dr. J. B. Parfitt, Surgical Cleanliness and the Present-day Practice of Dental Surgery.

INSTITUTE OF MEDICAL PSYCHOLOGY, Malet Place, W.C.—*Mon.*, 4.45 p.m., Tutorial on Mental Health in Childhood for Medical Graduates. *Wed.*, 8 p.m. and 7 p.m., Lecture and Case Histories of Mental Health in Childhood.

LONDON SCHOOL OF DERMATOLOGY, 5, Lisle Street, W.C.—*Tues.*, 5 p.m., Dr. J. E. M. Wigley, Tuberculosis Cutis. *Thurs.*, 5 p.m., Dr. G. B. M. Heggs, Some Affections of the Skin of the Foot.

NATIONAL HOSPITAL, Queen Square, W.C.—*Mon.* to *Fri.*, 2 p.m., Out-patient Clinics. *Mon.*, 3.30 p.m., Dr. C. M. Hinds Howell, Neurosyphilis. *Tues.*, 3.30 p.m., Dr. M. Critchley, Cerebral Vascular Disease. *Wed.*, 3.30 p.m., Dr. S. A. Kinnier Wilson, Clinical Demonstration. *Thurs.*, 3.30 p.m., Dr. E. A. Carmichael, Myopathic Diseases. *Fri.*, 3.30 p.m., Mr. Elmquist, Demonstration of Re-educational Methods.

NATIONAL HOSPITAL FOR DISEASES OF THE HEART, Westmoreland Street, W.—*Tues.*, 5.30 p.m., Dr. T. F. Cotton, Rheumatic Carditis and its Treatment.

WEST LONDON HOSPITAL POST-GRADUATE COLLEGE, Hammersmith, W.—*Mon.*, 10 a.m., Skin Clinic, Medical Wards; 11 a.m., Surgical Wards; 2 p.m., Gynaecological and Surgical Wards, Gynaecological and Eye Clinics. *Tues.*, 10 a.m., Medical Wards; 11 a.m., Surgical Wards; 2 p.m., Throat Clinic; 4.15 p.m., Mr. Woodd Walker, Derangements of Knee-joint. *Wed.*, 10 a.m., Children's Ward and Clinic; 11 a.m., Medical Wards; 2 p.m., Eye Clinic; 4.15 p.m., Lecture or Anaesthetics. *Thurs.*, 10 a.m., Neurological and Gynaecological Clinics; 12 noon, Fracture Clinic; 2 p.m., Eye and Genito-Urinary Clinics. *Fri.*, 10 a.m., Skin Clinic; 12 noon, Lecture on Treatment; 2 p.m., Throat Clinic. *Sat.*, 10 a.m., Children's Clinic, Medical Wards, Surgical Clinic. The lectures at 4.15 p.m. are open to all medical practitioners without fee.

GLASGOW POST-GRADUATE MEDICAL ASSOCIATION.—At Royal Hospital for Sick Children: *Wed.*, 4.15 p.m., Mr. Alexander MacLennan, Orthopaedic Cases.

LEEDS POST-GRADUATE CLINICAL DEMONSTRATIONS.—At Leeds General Infirmary: *Tues.*, 3.30 p.m., Mr. E. R. Flint, Demonstration of Cases.

LEEDS PUBLIC DISPENSARY AND HOSPITAL.—*Wed.*, 4 p.m., Dr. H. H. Moll, Minor Allergic Diseases—Hay Fever, Urticaria, etc.

NEWCASTLE-ON-TYNE: UNIVERSITY OF DURHAM COLLEGE OF MEDICINE.—At Newcastle General Hospital: *Sun.*, 10.30 a.m., Mr. J. Collingwood Stewart, Selected Cases. At Babies' Hospital: *Thurs.*, 2.15 p.m., Lecture and Clinical Demonstration on Tuberculosis in Childhood. At Royal Victoria Infirmary: *Thurs.*, 2.15 p.m., Demonstrations on Clinical Pathology.

VACANCIES

All advertisements should be addressed to the Financial Secretary and Business Manager and NOT *to the Editor.*

ALDRICH-BLAKE MEMORIAL TRUST, Hunter Street, W.C.—Aldrich-Blake Travelling Scholarship for medical women. Value 200 guineas.

ASHTON-UNDER-LYNE: DISTRICT INFIRMARY.—H.S. Salary £150 p.a.

BATH: ROYAL UNITED HOSPITAL.—H.S. (male, unmarried). Salary £150 p.a.

BECKENHAM: BETHLEM ROYAL HOSPITAL.—Junior Assistant P. (male, unmarried). Salary £350-£30-£500 p.a.

BIRKENHEAD GENERAL HOSPITAL.—(1) Senior H.S. (male). Salary £150 p.a. (2) Second H.S. (3) H.P. (4) C.O. Males. Salaries £100 p.a. each.

BIRMINGHAM CITY.—Temporary M.O. (female) in the Maternity and Child Welfare Department. Salary £10 per week.

BIRMINGHAM: QUEEN'S HOSPITAL.—(1) Bacteriologist and Clinical Pathologist. (2) Resident Surgical Registrar. Salaries £600 p.a. and £100 p.a., respectively.

BLACKPOOL: VICTORIA HOSPITAL.—(1) General Superintendent (male). Salary £400-£600 p.a. (2) H.S. (male). Salary £200 p.a.

BRADFORD ROYAL INFIRMARY.—H.S. (male, unmarried). Salary £135 p.a.

BRITISH RED CROSS SOCIETY, Grosvenor Crescent, S.W.—Two M.O's. for a Medical Unit to Abyssinia. Salaries £600 p.a. each.

CANTERBURY: KENT AND CANTERBURY HOSPITAL.—H.P. (male, unmarried). Salary £125 p.a.

CHESTER ROYAL INFIRMARY.—H.P. (male). Salary £150 p.a.

CITY OF LONDON HOSPITAL FOR DISEASES OF THE HEART AND LUNGS, Victoria Park, E.—H.P. (male). Salary £100 p.a.

COLCHESTER: ROYAL EASTERN COUNTIES' INSTITUTION FOR THE MENTALLY DEFECTIVE.—A.M.O. (female, unmarried). Salary £350 p.a.

DEWSBURY AND DISTRICT GENERAL INFIRMARY.—Senior H.S. (male). Salary £200 p.a.

DONCASTER ROYAL INFIRMARY.—H.S. (male) to the Eye, and Ear, Nose, and Throat Departments. Salary £175 p.a.

EAST HAM MEMORIAL HOSPITAL, Shrewsbury Road, E.—H.P. (male). Salary £150 p.a.

ESSEX COUNTY COUNCIL.—(1) Assistant Resident Radiologist. (2) J.R.M.O. Salaries £250 p.a. each. (3) General Consulting P. at Oldchurch Hospital, Romford. Salary £300 p.a.

EGYPT: DEPARTMENT OF PUBLIC HEALTH.—Director of the Lunacy Division. Salary £E.1,020-£E.1,200 p.a.

HULL ROYAL INFIRMARY.—Second C.O. (male, unmarried). Salary £150 p.a.

INFANTS HOSPITAL, Vincent Square, S.W.—(1) R.M.O. Salary £300 p.a. (2) Two P's.

IPSWICH COUNTY BOROUGH.—A.M.O. (unmarried) at the Ipswich Sanatorium. Salary £350-£25-£450 p.a.

LANCASHIRE COUNTY COUNCIL.—J.A.M.O. (male, unmarried) at the Wrightington Hospital. Salary £200 p.a.

LEEDS VOLUNTARY HOSPITALS COUNCIL.—Hon. Assistant P. to the General Infirmary at Leeds.

LIVERPOOL HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST.—R.M.O. Salary £150 p.a.

LONDON COUNTY COUNCIL.—(1) A.M.O's. (male, Grade I) at (*a*) Lambeth Hospital, S.E., (*b*) St. Alfege's Hospital, S.E., (*c*) St. George-in-the-East Hospital, E., (*d*) Paddington Hospital, W., (*e*) St. Peter's Hospital, E., and (*f*) Mile End Hospital, E. Salaries £350-£25-£425 p.a. each. (2) H.P. (male) at Dulwich and St. Andrew's Hospitals. Salary £120 p.a.

LONDON HOSPITAL, E.—Medical First Assistant and Registrar. Salary £300 p.a.

LOWESTOFT AND NORTH SUFFOLK HOSPITAL.—J.H.S. (male). Salary £120 p.a.

MANSFIELD AND DISTRICT HOSPITAL.—Senior H.S. (male). Salary £200 p.a.

MIDDLESEX COUNTY COUNCIL.—J.R.A.M.O. to North Middlesex County Hospital, Edmonton. Salary £250 p.a.

NEWCASTLE-UPON-TYNE: HOSPITAL FOR SICK CHILDREN.—R.S.O. (male). Salary £250 p.a.

NEW ZEALAND: NORTH CANTERBURY HOSPITAL BOARD.—Medical Superintendent to the Christchurch Hospital and allied Institutions under the control of the Board. Salary £1,100 p.a.

NORTHAMPTON COUNTY MENTAL HOSPITAL.—Second A.M.O. Salary £450-£25-£500 p.a.

QUEEN CHARLOTTE'S MATERNITY HOSPITAL, Marylebone Road, N.W.—(1) Resident Anaesthetist. (2) A.R.M.O. (male). Salary £100 p.a. and £80-£100 p.a., respectively. (3) Resident Anaesthetist and District R.M.O. Salary £90 p.a.

QUEEN'S HOSPITAL FOR CHILDREN, Hackney Road, E.—(1) R.M.O. Salary £200 p.a. (2) H.S. (3) C.O. Salaries £100 p.a. each.

ROYAL NATIONAL ORTHOPAEDIC HOSPITAL, Great Portland Street, W.—Assistant Resident S. (male, unmarried) at the Country Branch, Stanmore. Salary £250 p.a.

ROYAL NAVAL MEDICAL SERVICE.—Eight M.O's.

ST. LEONARD'S-ON-SEA: BUCHANAN HOSPITAL.—Hon. S.

SHEFFIELD ROYAL HOSPITAL.—Whole-time Clinical Assistants to (*a*) Ophthalmic Department and (*b*) Ear, Nose, and Throat Department. Salaries £300 p.a. each.

SHREWSBURY: ROYAL SALOP INFIRMARY.—Resident H.S. (male, unmarried). Salary £160 p.a.

SHREWSBURY: SALOP MENTAL HOSPITAL.—A.M.O. (male).

WEST LONDON HOSPITAL, Hammersmith Road, W.—Half-time Pathologist in charge of the Department of Morbid Anatomy. Salary £300 p.a.

WEST RIDING OF YORKSHIRE COUNTY COUNCIL.—School Medical Inspector. Salary £500-£25-£700 p.a.

WINCHESTER: ROYAL HAMPSHIRE COUNTY COUNCIL.—Assistant Hon. Clinical Pathologist.

WOOLWICH AND DISTRICT WAR MEMORIAL HOSPITAL, S.E.—H.P. (male). Salary £100 p.a.

WORCESTER ROYAL INFIRMARY.—Hon. S.

This list is compiled from our advertisement columns, where full particulars are given. To ensure notice in this column advertisements must be received not later than the first post on Tuesday morning. Further unclassified vacancies will be found in the advertising pages.

APPOINTMENTS

DONALD, D. A., *M.C.*, M.B., Ch.B.Ed., Admiralty Surgeon and Agent for North Berwick.

MACKIE, E. Gordon, M.B., F.R.F.P.S., D.O.M.S., extension of present appointment as Ophthalmic Specialist Medical Referee under the Workmen's Compensation Act, 1925, for Circuits 16 (East Riding) and 17 (Lincolnshire) to include all Courts in Circuits 13 (Sheffield, etc.) and 18 (Nottingham, etc.).

MACLEOD, Donald, F.R.C.S., Clinical Assistant, All Saints' Hospital for Genito-Urinary Diseases, Austral Street, S.E.

MILNER, J. G., M.B., B.Chir., F.R.C.S., Assistant Surgeon, Royal Westminster Ophthalmic Hospital.

BIRTHS, MARRIAGES, AND DEATHS

The charge for inserting announcements of Births, Marriages, and Deaths is 9*s., which sum should be forwarded with the notice not later than the first post on Tuesday morning, in order to ensure insertion in the current issue.*

BIRTHS

GARLAND.—On January 23rd, 1936, at Leeds, to Joyce, wife of Dr. Hugh Garland, a daughter.

WHITTLE.—On January 23rd, 1936, at Brookfield, Cambridge, to Phyllis (née Fricker), wife of Dr. C. Howard Whittle, a son.

DEATH

WILLIAMS.—Erroll H. Williams, D.F.C., M.B., Ch.B., B.D.S., on January 24th, 1936, from pneumonia, at 46, Roe Lane, Southport, the dearly beloved husband of Merle E. Williams, in his 37th year. Interment at St. Cuthbert's Church, Churchtown, on Monday last at 12 noon.